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ABSTRACT

The Conceptual Learning and Development (CLD) Model suggests four successive levels of concept learning: (1) concrete--recognizing an object which has been encountered previously; (2) identity--recognizing a known object when it appears in a different spatial, time, or sensory perspective; (3) classificatory--generalizing that two items are alike in some way; and (4) formal--naming and defining the concept, listing its attributes, and judging the presence of such attributes in an object. Once a concept is attained, the individual may use the concept in generalizing to new instances, cognizing supraordinate-subordinate relations, cognizing other relations among concepts, and generalizing to problem-solving situations. Seven subtests were developed to assess the level of attainment and use of the concept, tree, from kindergarten through twelfth grade. Criteria for the development of this battery involved several points, in addition to the standard requirements for reliability, objectivity, and usability: it should be appropriate for group administrations to preschool through high school students; and the measures should test a concept that has perceptible representations, generally recognized definitions, and structural taxonomy; is related to the students' curriculum; and is usable in cognizing principles and in problem solving. The battery and administration instructions are appended. (GDC)

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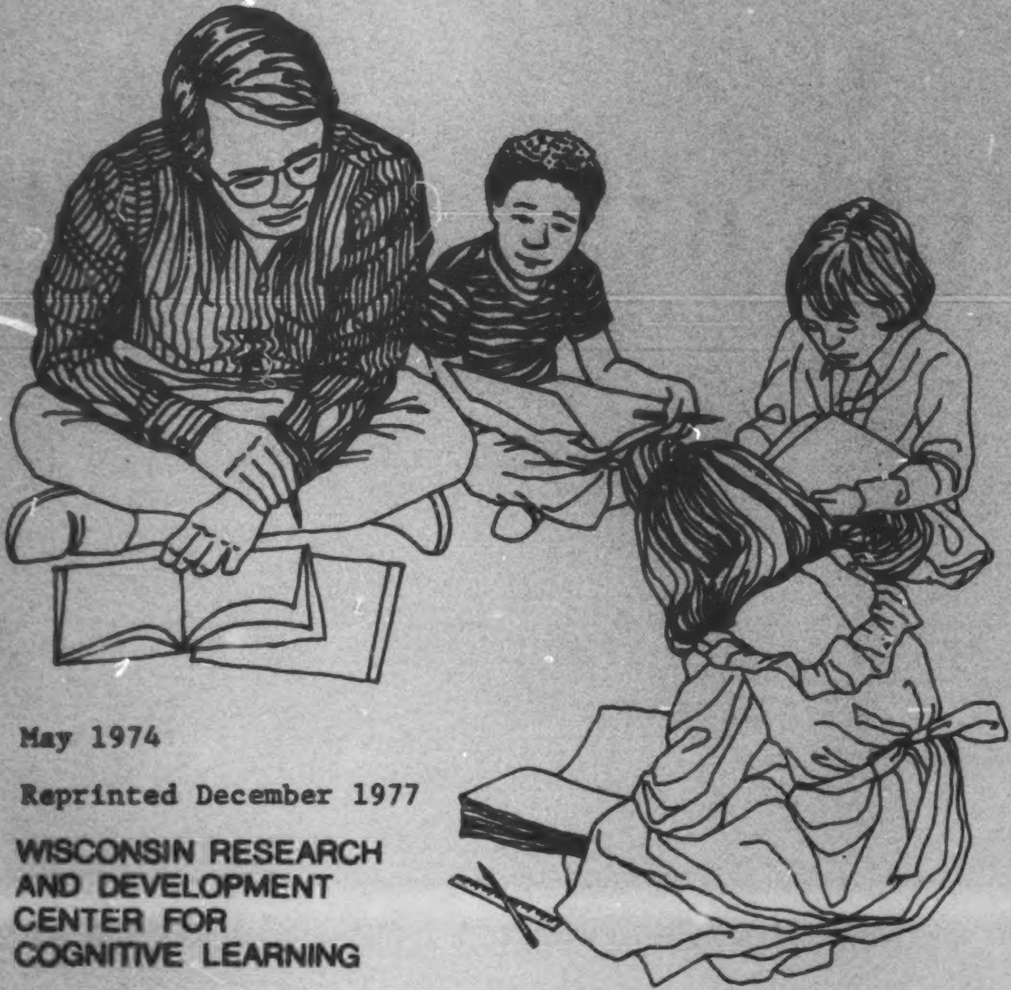
Technical Report No. 433

DEVELOPMENT OF CONCEPTUAL LEARNING AND DEVELOPMENT ASSESSMENT SERIES IV: TREE

by Herbert J. Klausmeier, Richard S. Marliave,
Conrad G. Katzenmeyer, and Thomas S. Sipple



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**WISCONSIN RESEARCH
AND DEVELOPMENT
CENTER FOR
COGNITIVE LEARNING**

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Report from the Project on
Children's Learning and Development

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May 1974

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- developing and demonstrating improved instructional strategies, processes, and materials for students, teachers, and school administrators

- providing assistance to educators which helps transfer the outcomes of research and development to improved practice in local schools and teacher education institutions

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CENTER FOR COGNITIVE LEARNING

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I

OVERVIEW OF THE CONCEPTUAL LEARNING AND DEVELOPMENT MODEL

This working paper gives an overview of a model of conceptual learning and development (CLD model). The CLD model, in turn, provides the basis for assessing children's level of conceptual development. The assessment of the level of conceptual development requires assessment tools and procedures that may be used with children of about age 4 - 18. The first set of assessment exercises to assess children's level of attainment as well as use of the concept tree is presented in this paper after a brief overview of the CLD model.

II

THEORETICAL FRAMEWORK

Model of Conceptual Learning and Development (CLD)

The CLD model is based on laboratory and school experiments. The model was formally reported by Klausmeier (1971) and described more fully by Klausmeier, Ghatala, and Frayer (1972). The CLD model is an analytical, descriptive model. It defines four levels of concept attainment and the possible uses and extensions of attained concepts, specifies the cognitive operations involved in learning concepts at each of the four levels, and postulates internal and external conditions of learning related to the specified levels. The levels of concept mastery and the operations and conditions of learning have been identified through behavioral analyses and empirical research in laboratory and school settings. Guidelines for developing instructional materials have also been formulated, based on the model and research in school settings.

A concept is defined as ordered information about the properties of one or more things--objects, events, or processes--that enables any particular thing or class of things to be differentiated from, and also related to, other things or classes of things. The word concept is used by Klausmeier, Ghatala, and Frayer (1972) to designate mental constructs of individuals as well as identifiable public entities that comprise part of the substance of the various disciplines. Thus, the term concept is used appropriately in two different contexts just as many other English words are.

Concepts as public entities are defined as the organized information corresponding to the meanings of words found in dictionaries, encyclopedias, and other books (Carroll, 1964). Words in a language can be thought of as a series of spoken or written entities. There are meanings for words that can be thought of as a standard of communicative behavior shared by those who speak a language. Finally, there are concepts that are the classes of experiences formed in individuals either independently of language processes or in close dependence on language processes. Putting the three together, Carroll stated: "A 'meaning' of a word is, therefore, a societally standardized concept, and when we say that a word stands for or names a concept it is understood that we are speaking of concepts that are shared among members of a speech community (Carroll, 1964, p. 187)."

When starting a large programmatic research effort dealing with concept learning and instruction, Klausmeier, Davis, Ramsay, Fredrick, and Davies (1965) formulated an idea of concept in terms of defining attributes which they identified as common to many concepts from various disciplines. Klausmeier, Ghatala, and Frayer (1972) carried the definition further by specifying eight attributes of concepts: learnability, usability, validity, generality, power, structure, instance numerousness, and instance perceptibility. Other researchers and subject-matter specialists are also treating concept in terms of defining attributes. For example, Flavell (1970) indicated that a formal definition of concept in terms of its defining attributes is useful in specifying what concepts are and what they are not and also in identifying the great variability among concepts. Markle and Tiemann (1969) and Tennyson and Boutwell (1971) have shown that the external conditions of concept learning can be delineated through research that starts with a systematic analysis of the attributes of the particular concepts used in the research.

The CLD model deals with concepts represented by words that can be defined in terms of attributes. It is pointed out that one cannot find definitions for all words which are stated in terms of defining attributes, even in unabridged dictionaries and technical treatises. Therefore, the researcher and the developer of curriculum materials must ascertain the defining attributes independently or cooperatively with scholars from the various disciplines.

Cognitive Operations and Levels of Concept Attainment

Figure 1 schematically presents the "structure" of the model. It shows the four levels at which individuals may attain the same concept, the operations involved at each level, the use and extension of concepts, and the acquisition of names for concepts and their attributes.

Concept levels. A unique feature of the model is that it specifies four levels of attainment of the same concept, rather than postulating attainment at a final level of mastery the first time the concept is learned. The long-term developmental context of the model is thus provided; the model explains the changes that occur in the level of mastery of concepts attained by the same individual across long time intervals.

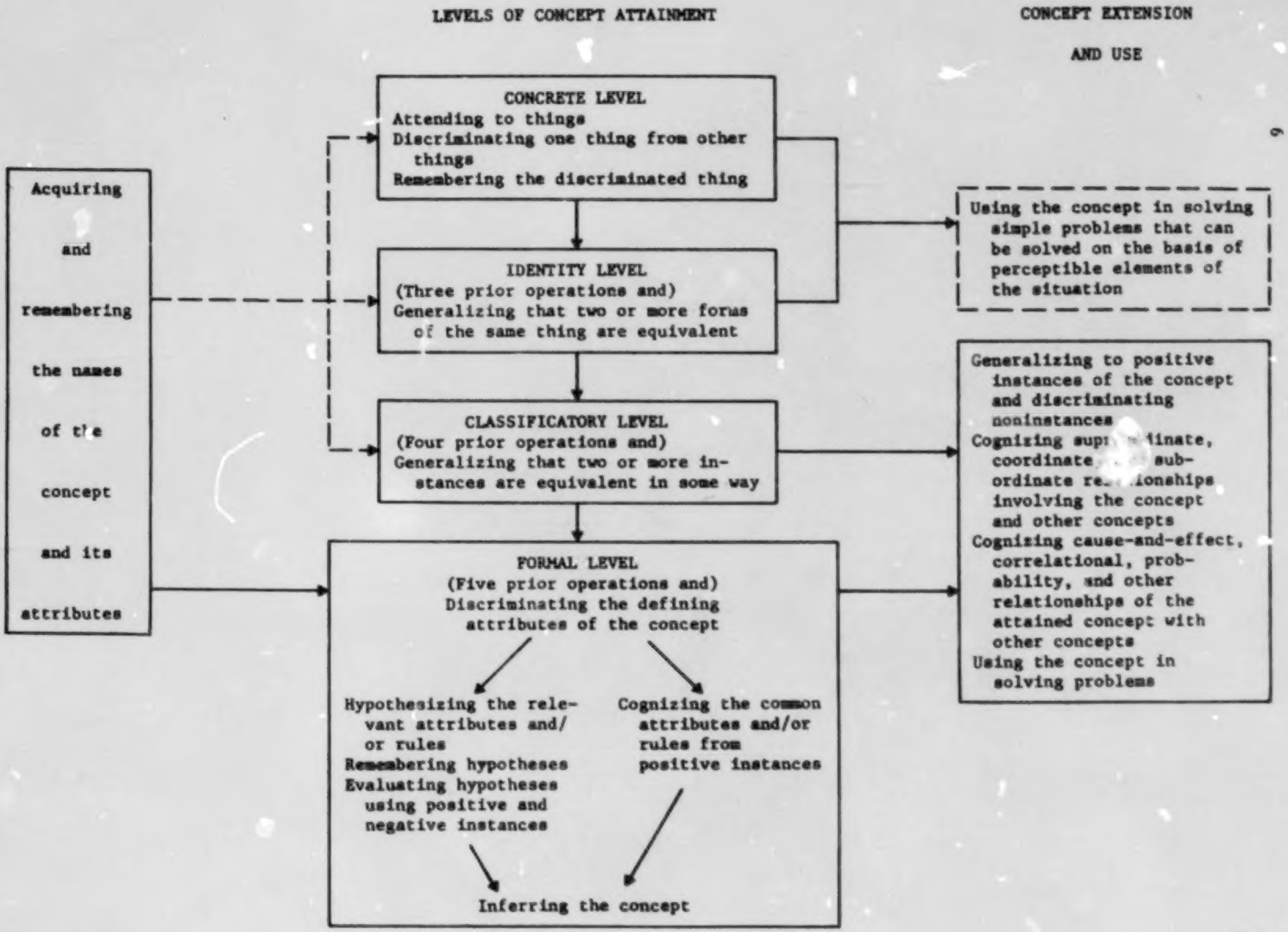
LEVELS OF CONCEPT ATTAINMENT
CONCEPT EXTENSION AND USE
CONCRETE LEVEL
Attending to things
Discriminating one thing from other things
Remembering the discriminated thing
IDENTITY LEVEL
(Three prior operations and)
Generalizing that two or more forms of the same thing are equivalent
CLASSIFICATORY LEVEL
(Four prior operations and)
Generalizing that two or more instances are equivalent in some way
FORMAL LEVEL
(Five prior operations and)
Discriminating the defining attributes of the concept
Hypothesizing the relevant attributes and/or rules
Remembering hypotheses
Evaluating hypotheses using positive and negative instances
Cognizing the common attributes and/or rules from positive instances
Inferring the concept
Acquiring and remembering the names of the concept and its attributes
Using the concept in solving simple problems that can be solved on the basis of perceptible elements of the situation
Generalizing to positive instances of the concept and discriminating noninstances
Cognizing superordinate, coordinate, and subordinate relationships involving the concept and other concepts
Cognizing cause-and-effect, correlational, probability, and other relationships of the attained concept with other concepts
Using the concept in solving problems

Figure 1. Cognitive operations in concept learning.

Attainment of a concept at the concrete level is inferred when the individual cognizes an object that he has experienced on a prior occasion. At this level, the object is experienced in exactly the same way on the second and later occasions. Attainment of a concept at the identity level is inferred when the individual cognizes an object as the same one previously encountered when observed from a different spatio-temporal perspective or sensed in a different modality. The attainment of a concept at the classificatory level is inferred when the individual treats at least two instances of the same set of things as equivalent. At this level the individual may be unable to name the attributes that are common to the instances. Attainment of a concept at the formal level is inferred when the individual can name the concept, discriminate and name the societally accepted defining attributes and values, and accurately evaluate instances as belonging or not belonging to the set in terms of the presence or absence of the defining attributes.

Successively attaining each higher level of a concept is postulated to be the normative pattern by which many individuals attain many concepts under two conditions: first, the concept is of the kind for which there are actual perceptible instances or representations of instances; and second, the individual has experiences with the instances starting in early childhood. For example, the individual will have successively formed a concept of tree at the concrete, identity, and classificatory levels before he describes and treats tree and various subclasses of plants formally in terms of their defining attributes. It is recognized that some concepts are not attained at all four of the successive levels because of the nature of the concepts or because the learning experiences of the individual do not permit their acquisition (Klausmeier, Ghatala, & Frayer, 1972).

Cognitive operations. Figure 1 also indicates the operations involved in attaining each level of a concept. This feature of the model provides the context for explaining short-term learning phenomena and also for identifying the changes that occur across time as new operations emerge and make possible attainment at successively higher levels.

In the CLD model the term operations is used much like Guilford (1967) uses the term, rather than the way Piagetians use it. Guilford defines the operations of cognition, memory, productive thinking and evaluation formally and also operationally in terms of test performances. He states that cognition must be related to the products cognized and defines cognition formally as follows:

> Cognition is awareness, immediate discovery or rediscovery, or recognition of information in various forms; comprehension or understanding. . . . The most general term, awareness, emphasizes having active information at the moment or in the present . . . the term, recognition, is applied to knowing the same particular on a second encounter . . . if cognition is practically instantaneous, call it recognition; if it comes with a slight delay, call it "immediate discovery." [Guilford, 1967, pp. 203-204]

According to Guilford, awareness, recognition, and immediate discovery apply generally to two products at the lower levels in his taxonomy, namely, units of information and classes. On the other hand, comprehension, which Guilford used synonymously with understanding, applies to the higher-level products of relations and systems. Thus, cognition of principles, sequences, patterns, or structures involves comprehension, rather than mere awareness, recognition, or immediate discovery.

The first step in attaining a concept at the concrete level is attending to an object and representing it internally (Woodruff, 1961). Gagné (1970) indicates that as the individual attends to an object he discriminates it from other objects. Woodruff (1961) calls the outcome of these attending and discriminating operations a concrete concept, a mental image of some real object experienced directly by the sense organs. The infant, for example, attends to a large red ball and a white plastic bottle, discriminates each one on a nonanalytic perceptual basis, maintains an internal representation of each, and cognizes each of the objects when experienced later.

Whereas the attainment of a concept at the concrete level involves only the discrimination of an object from other objects, attainment at the identity level involves both discriminating various forms of the same object from other objects and also generalizing the forms as equivalent. The new and critical operation is generalizing. For example, the child attaining the identity level of "dog" generalizes that the family poodle is the same poodle when seen from straight ahead, from the side, and from various angles.

The additional operations required for the attainment of a concept at the classificatory level is generalizing that different instances are equivalent in some way. The individual is still at the classificatory level when he correctly classifies a large number of instances as examples and others as nonexamples, but is unable to describe the basis for his grouping in terms of the defining attributes of the concept. Henley (cited in Deese, 1967), like many other researchers, reported that individuals can group things without being able to describe the basis of the grouping.

Two sets of operations are involved in the learning of concepts at the formal level, as shown in Figure 1. One set of operations includes discriminating and naming the defining attributes (Fredrick & Klausmeier, 1968; Kalish, 1966; Klausmeier & Meinke, 1968; and Lynch, 1966), hypothesizing the atributes that define the concept (Levine, 1963, 1967), remembering hypotheses (Ghatala, 1972; Williams, 1971), evaluating hypotheses (Bruner, Goodnow, & Austin, 1956), and inferring the concept. These operations go beyond those involved in attaining concepts at the classificatory level and occur when the individual infers the defining attributes by using information from positive and negative instances of the concept. The attribute information may be given to the individual verbally or he may secure it by attending to the positive and negative instances.

The second set of operations given in the right column of Figure 1 includes discriminating and naming the defining attributes, cognizing the common attributes and/or rules from only positive instances, and inferring the concept. According to Tagatz (1967), elementary-school children up to about age 12 carry out these operations. They are not able to utilize information well from negative instances or to hypothesize and evaluate the defining attributes.

Concerning memory, Atkinson and Shiffrin (1968) postulate three memory systems--a long-term store, a short-term store, and a sensory information register. There is ample evidence that in adults the predominant mode of information storage in both the short- and long-term systems is the verbal-linguistic mode. However, other modes of storage must be possible since adults are able to recognize smells, tastes, and visual stimuli which have not been verbally encoded. Also, a nonlinguistic store is presumed to be essential for preverbal children to learn concrete, identity, and rudimentary class concepts. Bruner (1964) discusses the nonlinguistic features of memory in terms of the enactive and ikonic representation of sensory experiences.

Concept Utilization and Extension

Horizontal transfer is implied by use of the attained concept in recognizing newly encountered examples and nonexamples. Vertical transfer and new learning are presumed to occur as the individual extends his knowledge about an attained concept through using it in understanding various relationships and in solving problems. The individual who has attained a concept at the classificatory or formal level may use it in four ways as shown in Figure 1--in generalizing to new instances, cognizing superordinate-subordinate relations, cognizing various other relations among concepts, and in generalizing to problem-solving situations. It is not implied that attainment of every concept at the classificatory and formal levels must be followed with all the uses. Little research has been completed regarding any of the uses of attained concepts; however, Ausubel's (1963) constructs of correlative and derivative subsumption are intended to explain how the individual relates concepts to one another. Similarly, Gagné (1970) postulates that having prerequisite concepts is an essential condition of rule learning and problem-solving.

III

PROCEDURES AND CRITERIA USED IN DEVELOPING THE ASSESSMENT EXERCISES

Procedures for Test Development

A subtest was developed to assess each of the four levels of concept attainment and three of the four uses. Because of the difficulty in devising a test to assess the use of a concept in identifying examples and nonexamples which would be distinct from the test assessing attainment of the classificatory level, this use of concepts was not separately assessed. Therefore, seven subtests were developed. The tests required specially constructed materials.

Criteria for Test Development

To develop the tests of concept attainment and utilization, we analyzed the behaviors involved and then constructed materials and developed instructions to assess the behaviors. The test items went through expert review while under development. The entire battery was then tried out on a small scale before it was used in this study.

A few criteria in addition to the usual ones of reliability, objectivity, and usability, were established to guide the development. First, the materials and instructions had to permit assessment of subjects of preschool age through high school. We hypothesized that not all subjects of preschool age would attain a given concept at the concrete level and that not all high school subjects would attain it at the formal level.

Second, the assessment exercises should be administrable to groups of children rather than to individuals. This decision was based on an earlier set of experimental exercises dealing with equilateral triangle which had been administered on an individual basis. Two weaknesses were found with this series of individually-administered exercises. First, certain items at the formal level of attainment and other items connected with uses of the concept in understanding principles and in cognizing subordinate and superordinate relations called for the subject to give the label equilateral triangle or some other label in response to questioning. Although the experimenter had reasonable assurance that a subject who did not give the label actually did not have the label in his spoken vocabulary, there was not complete certainty regarding this. By using multiple-choice items which gave the correct label as one of the choices, this problem was overcome and at the same time the battery could be administered in groups to children who could read reasonably well. A second limitation of the individually-administered items was that judgments were required for the open-ended scoring responses to many items in addition to those based on having the correct label. This weakness was also eliminated by developing a paper and pencil battery.

The third criterion for the selection of the concept was that it had to have perceptible instances or representations thereof. An instance of the concept or a representation of it was needed to test for attainment at the concrete, identity, and classificatory levels.

The fourth selection criterion was that the concept had to be definable by publicly accepted attributes in order to test attainment at the formal level. In this connection we noted earlier that many concepts are definable in terms of attributes even though this method of definition is often not used in abridged dictionaries.

Fifth, the concept selected for a battery should be relatable to the subject matter which children encounter in school. This is in line with our proposition that directed experience, including instruction in school, is a powerful determininant of the particular concepts attained by individuals and also of their level of attainment and use. Further, since much instruction in school deals with concepts, our model should have applicability to the design of instruction, and the subtests should be usuable, when fully validated, in assessing the level of conceptual development in school-age children.

Sixth, the particular concept had to be part of a taxonomy in order to test its use in cognizing supraordinate-subordinate relationships.

Finally, the concept had to be usuable in cognizing principles and in problem solving. Here, the concept may be usable in solving simple problems without being used first in understanding a principle, or it may be used first in understanding a principle, or it may be used first in understanding a principle and then in solving more complex problems.

Three of many concepts that meet these criteria are equilateral triangle from the field of mathematics, noun from the field of English, and tree from the field of science. The concept tree was selected for the fourth battery of tests to be developed and administered.

IV

TEST BATTERY INSTRUCTIONS

I-Introduction

The purpose of the Concept Development battery is to assess the level of concept attainment the child has achieved. These instruments are based on the model of conceptual learning and development proposed by H. J. Klausmeier. The battery is intended for use from kindergarten through twelfth grade. However, it may not be necessary or desirable to administer all items or subtests at each grade level.

It is generally assumed that (1) intermediate aged children respond correctly to all items in booklet A; and (2) primary aged children respond incorrectly to certain items in booklets C and D. Therefore, it may be unnecessary to administer part or all of certain booklets to all age levels. It is also necessary to recognize that when younger children are not administered all items, it becomes impossible for them to show full mastery of certain levels. The number of items administered or not administered should be determined in light of the goals of the particular research study.

The battery is administered to intact classroom groups at the higher primary level and above, and to smaller groups of 5 to 7 children at the lower primary level.

The entire battery is read to students regardless of their grade level. Therefore, it is essential that all students be working on the question being read by the administrator. Students mark their answers directly on the test pages so no separate answer sheet is required. Children should not be allowed to change answers on subtests already taken. All materials needed for testing sessions are listed below:

Materials the student will need:

1. Concept Development Battery
2. Cleared desk top or space to work
3. Pencil

Materials the test administrator will need:

1. Test administrator's manual
2. Copy of the test booklets for demonstration
3. Extra pencils
4. A "Testing: DO NOT DISTURB" sign for the door

Since all directions given orally must be read word for word, it is important that the test administrator study the directions in each manual prior to testing. Familiarity with test directions is enhanced by working with a copy of the test in hand. Directions to the test administrator are in small letters and enclosed in parentheses. Directions to be read to children are in capital letters. In some instances, instructions differ among various forms of the battery being administered; in such cases, the differing instructions will be enclosed in asterisks and labeled appropriatel

II Directions for Administering the Battery

(Distribute test booklets and pencils to students. The booklets should be passed out and collected separately for each section of the Battery - IVA, IVB, IVC, IVD)

Directions for Booklet IVA

(For Kindergarten enter the requested identification information. Direct older students to fill in the name section.) DO NOT TURN THE PAGE UNTIL I TELL YOU TO. ON THE TOP OF THE PAGE FILL IN YOUR NAME. YOU ARE GOING TO BE ASKED QUESTIONS ABOUT THE WAYS IN WHICH THINGS ARE ALIKE, OR THE WAYS IN WHICH THINGS ARE DIFFERENT. THE QUESTIONS ARE NOT ABOUT YOUR SCHOOL WORK, AND YOU WILL NOT RECEIVE A GRADE. YOU MAY FIND SOME THE QUESTIONS EASY. OTHERS MAY BE VERY DIFFICULT BECAUSE YOU MAY NOT HAVE LEARNED ABOUT THESE THINGS YET. PLEASE FOLLOW THE DIRECTIONS I GIVE YOU VERY CAREFULLY AND TRY TO DO YOUR BEST ON EACH QUESTION. IN THIS BOOKLET YOU WILL LOOK AT A DRAWING AND THEN FIND ONE THAT LOOKS THE SAME ON THE NEXT PAGE. OPEN YOUR BOOKLET TO PAGE 1. (Demonstrate. Check to see that each child's booklet is open to page 1.)

****

Primary Instructions for Example Items

IN THIS BOOKLET YOU WILL LOOK AT A DRAWING AND THEN FIND ONE THAT LOOKS THE SAME IN A GROUP OF DRAWINGS ON THE NEXT PAGE.

LOOK CAREFULLY AT THE DRAWING. (Pause.) NOW TURN TO PAGE 2.

THERE IS AN "X" ON THE DRAWING THAT LOOKS THE SAME AS THE ONE YOU JUST SAW. (Pause.) NOW LET'S DO ANOTHER EXAMPLE, BUT THIS TIME YOU WILL MARK THE "X" ON THE CORRECT DRAWING YOURSELF. TURN TO PAGE 3 AND LOOK CAREFULLY AT THE DRAWING. (Demonstrate. Check to see that each child's booklet is open to this page.)

NOW TURN TO PAGE 4 AND MARK AN "X" ON THE DRAWING THAT LOOKS THE SAME AS THE ONE YOU SAW ON PAGE 3. DO NOT LOOK BACK. (Pause.)

YOU SHOULD HAVE MARKED AN "X" ON THIS DRAWING. (Point to second drawing from left.) DO YOU HAVE ANY QUESTIONS ABOUT WHAT TO DO? (Pause.) THE REST OF THE QUESTIONS IN THIS BOOKLET WILL BE LIKE THE ONES YOU JUST DID. FIRST, YOU WILL LOOK CAREFULLY AT A DRAWING ON A PAGE. THEN YOU WILL MARK AN "X" ON THE DRAWING THAT LOOKS THE SAME AS THE ONE ON THE NEXT PAGE. WHEN YOU'RE NOT SURE OF AN ANSWER, MARK THE ANSWER YOU THINK IS RIGHT. DON'T WORK AHEAD AND DON'T SAY ANYTHING OUT LOUD. WHEN YOU WANT TO CHANGE AN ANSWER, ERASE THE FIRST "X" YOU MADE. THEN MARK AN "X" ON THE DRAWING YOU THINK IS RIGHT. YOU MUST NOT LOOK BACK AFTER YOU HAVE BEEN TOLD TO TURN A PAGE. READY? (Note: For every item, the test administrator should check to see that each child is on the correct page.

****

****

Intermediate Instructions for Example Items

IN THIS BOOKLET YOU ARE TO LOOK AT A DRAWING AND THEN FIND ONE THAT LOOKS THE SAME IN A GROUP OF DRAWINGS ON THE NEXT PAGE. SEE EXAMPLE "A" ON PAGE 1. (Pause.) NOW TURN TO PAGE 2.

THERE IS AN "X" ON THE DRAWING THAT LOOKS THE SAME AS THE ONE YOU SAW ON PAGE 1. (Pause.)

ANOTHER EXAMPLE IS GIVEN ON THE NEXT PAGE BUT THIS TIME YOU WILL NEED TO MARK THE "X" ON THE CORRECT DRAWING YOURSELF. LOOK AT THE DRAWING ON PAGE 3.

NOW TURN TO PAGE 4 AND MARK AN "X" ON THE DRAWING THAT LOOKS THE SAME AS THE ONE YOU SAW ON PAGE 3. DO NOT LOOK BACK. (Pause.)

YOU SHOULD HAVE MARKED AN "X" ON THE SECOND DRAWING FROM THE LEFT. ARE THERE ANY QUESTIONS? (Pause.) THE REST OF THE BOOKLET WILL BE LIKE THE EXAMPLES YOU JUST DID. YOU WILL STUDY ONE DRAWING, THEN MARK THE DRAWING THAT LOOKS THE SAME ON THE NEXT PAGE. DO NOT LOOK BACK AFTER YOU HAVE BEEN TOLD TO TURN A PAGE. IF YOU WISH TO CHANGE AN ANSWER, BE SURE TO ERASE YOUR FIRST "X" COMPLETELY.

****

TURN TO PAGE 5 AND LOOK CAREFULLY AT THE DRAWING. (Pause.) TURN TO PAGE 6.

MARK THE DRAWING THAT LOOKS THE SAME AS THE ONE YOU JUST SAW. DO NOT LOOK BACK. (Pause.)

TURN TO PAGE 7 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 8.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 9 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 10.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 11 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 12.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 13 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 14.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 15 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 16.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 17 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 18.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 19 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 20.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 21 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 22.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 23 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 24.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 25 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 26.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 27 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 28.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 29 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 30.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 31 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 32.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 33 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 34.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.)

TURN TO PAGE 35 AND LOOK AT THE DRAWING. (Pause.) TURN TO PAGE 36.

MARK THE DRAWING THAT LOOKS THE SAME. (Pause.) THAT IS THE LAST QUESTION IN THIS BOOKLET. (Collect booklets.)

****

Directions for Booklet IVB

(For Kindergarteners enter their name information. Direct older students to fill in their names.)

IN THIS BOOKLET ARE MORE QUESTIONS ABOUT THE WAYS IN WHICH THINGS ARE SIMILAR OR DIFFERENT. YOU WILL MARK YOUR ANSWERS IN THE SAME WAY, BY MARKING AN "X" ON THE DRAWING YOU CHOOSE. WHEN YOU'RE NOT SURE OF AN ANSWER, MARK THE ANSWER YOU THINK IS RIGHT. WHEN YOU WANT TO CHANGE AN ANSWER, ERASE THE FIRST "X" YOU MADE. THEN MARK AN "X" ON THE DRAWING YOU THINK IS RIGHT. OPEN YOUR BOOKLET TO PAGE 1. (Demonstrate.)

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Primary Instructions for Example Items

(Note for Kindergarten: For examples A and B and questions 1 and 2 substitute "over here" for both "(on the right)" and "(on the left)." Using a test booklet, demonstrate the stimulus and item response positions referred to by "over here.")

IN THIS SECTION YOU ARE TO MARK THE DRAWING (ON THE RIGHT) THAT IS LIKE THE DRAWING (ON THE LEFT) IN SOME WAY. ON THIS PAGE IS AN EXAMPLE THAT HAS ALREADY BEEN MARKED. LISTEN CAREFULLY WHILE I READ THE DIRECTIONS. EXAMPLE A SAYS "THE THING (ON THE LEFT) IS ALIVE. PUT AN X ON THE THING (ON THE RIGHT) THAT IS ALSO ALIVE." THE THING (ON THE LEFT) IS ALIVE. THERE IS AN X ON THE THING (ON THE RIGHT) THAT IS ALSO ALIVE.

NOW WE WILL DO ANOTHER EXAMPLE, BUT THIS TIME YOU WILL MARK THE ANSWER. TURN TO PAGE 2.

"THE THING (ON THE LEFT) IS ALIVE. PUT AN X ON THE THING (ON THE RIGHT) THAT IS ALSO ALIVE." (Repeat sentences. Pause.) THE THING (ON THE LEFT) IS ALIVE. YOU SHOULD HAVE PUT AN X ON THIS THING (Point.) BECAUSE IT ALSO IS ALIVE.

DO YOU HAVE ANY QUESTIONS ABOUT WHAT TO DO? (Go back over examples A and B if there are questions.) TURN TO PAGE 3.

(Read questions 1 and 2 aloud. Read each question twice. Pace students through the items. Wais until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

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Intermediate Instructions for Example Items

IN THIS SECTION YOU ARE TO MARK THE DRAWING ON THE RIGHT THAT IS LIKE THE DRAWING ON THE LEFT IN SOME WAY. LOOK AT EXAMPLE A. THE THING ON THE LEFT IS ALIVE. PUT AN X ON THE THING ON THE RIGHT THAT IS ALSO ALIVE. THE DRAWING ON THE LEFT IS ALIVE. THERE IS AN X ON THE THING ON THE RIGHT THAT IS ALSO ALIVE. TURN TO PAGE 2.

HERE IS ANOTHER EXAMPLE, BUT THIS TIME YOU ARE TO MARK THE X. THE THING ON THE LEFT IS ALIVE. PUT AN X ON THE THING ON THE RIGHT THAT IS ALSO ALIVE. (Pause.) THE THING ON THE LEFT IS ALIVE. YOU SHOULD HAVE PUT AN X ON THE FIRST THING IN THE TOP ROW, BECAUSE IT ALSO IS ALIVE. ARE THERE ANY QUESTIONS ABOUT WHAT TO DO? (Pause - if there are any questions, go back over the two problems.) TURN TO PAGE 3. (Using your test booklet, read aloud questions 1-2. Read each question once. Pace students through the items. Wait until all students have completed an item before going to the next item. Check to see that all students are on the right page.)

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PROBLEM 1. THE THING ON THE LEFT HAS A CERTAIN KIND OF STEM. PUT AN X ON THE THING ON THE RIGHT THAT HAS THE SAME KIND OF STEM.

MARK YOUR ANSWER. TURN TO PAGE 4.

PROBLEM 2. THE THING ON THE LEFT HAS A CERTAIN KIND OF STEM. PUT AN X ON THE THING ON THE RIGHT THAT HAS THE SAME KIND OF STEM.

MARK YOUR ANSWER. TURN TO PAGE 5.

****

Primary Instructions for Questions 3-8

NOW THERE WILL BE MORE THAN ONE DRAWING TO MARK. LOOK CAREFULLY AT EACH DRAWING BELOW BEFORE YOU MARK YOUR ANSWERS. REMEMBER THAT YOU WILL PUT AN "X" ON MORE THAN ONE DRAWING. (Read questions 3-8 aloud. Read each item twice. Pace students through the items. Wait until all students have completed an item before proceeding to the next item.)

****

Intermediate Instructions for Questions 3-8

IN THE FOLLOWING PROBLEMS THERE WILL ALWAYS BE MORE THAN ONE DRAWING TO MARK. (Read questions 3-8 aloud. Read each item once. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

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PROBLEM 3. PUT AN X ON EACH OF THE THINGS BELOW THAT HAVE WOODY STEMS.

MARK YOUR ANSWER. TURN TO PAGE 6.

PROBLEM 4. PUT AN X ON EACH OF THE THINGS BELOW THAT HAVE WOODY STEMS.

MARK YOUR ANSWER. TURN TO PAGE 7.

PROBLEM 5. PUT AN X ON EACH OF THE THINGS BELOW THAT HAVE WOODY STEMS.

MARK YOUR ANSWER. TURN TO PAGE 8.

PROBLEM 6. PUT AN X ON EACH OF THE THINGS BELOW THAT HAVE WOODY STEMS.

MARK YOUR ANSWER. TURN TO PAGE 9.

PROBLEM 7. PUT AN X ON EACH OF THE THINGS BELOW THAT HAVE WOODY STEMS.

MARK YOUR ANSWER. TURN TO PAGE 10.

PROBLEM 8. PUT AN X ON EACH OF THE THINGS BELOW THAT HAVE WOODY STEMS.

MARK YOUR ANSWER. TURN TO PAGE 11.

****

Primary Instructions for Kindergarten Questions 9-16

NOW YOU WILL BE ASKED ABOUT THE WAYS THAT THINGS CAN BE PUT INTO MORE THAN ONE GROUP. FOR EACH QUESTION YOU WILL SEE A GROUP OF DRAWINGS AND A QUESTION ABOUT THESE DRAWINGS. I AM GOING TO READ THIS QUESTION. (Point.) I WILL ALSO READ FOUR DIFFERENT ANSWERS TO THE QUESTION. (Point to each answer choice and indicate that a is one answer, b is another answer, etc., through d.) ONLY ONE OF THESE ANSWERS IS RIGHT. YOU ARE TO MARK AN "X" ON ONLY ONE OF THESE LETTERS, A, B, C, OR D. WHEN YOU DON'T KNOW THE ANSWER, YOU CAN MARK AN "X" ON D, WHICH SAYS "I DON'T KNOW." DO YOU UNDERSTAND WHAT YOU ARE TO DO? (Repeat the above procedure if necessary. Read question 9 and its answer choices twice. Point to each answer choice as you read it aloud.)

* * *

Primary Instructions for Grade Three Questions 9-16

NOW YOU WILL BE ASKED ABOUT THE WAYS THAT THINGS CAN BE PUT INTO MORE THAN ONE GROUP. FOR EACH QUESTION YOU WILL SEE A GROUP OF DRAWINGS AND A QUESTION ABOUT THESE DRAWINGS. I WILL READ THE QUESTION AND THE DIFFERENT ANSWER CHOICES FOR THE QUESTION. ONLY ONE OF THE ANSWERS IS CORRECT. YOU ARE TO MARK AN "X" ON THE LETTER OF THE ANSWER CHOICE THAT YOU THINK IS RIGHT. WHEN YOU DON'T KNOW THE ANSWER, YOU CAN MARK D, WHICH SAYS "I DON'T KNOW." YOU MAY READ ALONG SILENTLY AS I READ OUT LOUD. READY? (Read question 9 and its answer choices twice.)

(For both Kindergarten and third grade read questions 9-16 aloud. Read each question and the answer choices twice. For Kindergarten point to each answer choice as you read it aloud. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

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Intermediate Instructions for Questions 9-16

THIS SECTION DEALS WITH THE WAYS THAT THINGS CAN BE PUT INTO MORE THAN ONE GROUP. FOR EACH PROBLEM YOU WILL SEE A GROUP OF DRAWINGS AND A QUESTION ABOUT THESE DRAWINGS. YOU ARE TO SELECT THE CORRECT ANSWER TO THE QUESTION. MARK AN "X" ON THE LETTER THAT IDENTIFIES THE CORRECT ANSWER. FOR SOME OF THE QUESTIONS YOU MAY NOT KNOW THE CORRECT ANSWER. IF NOT, MARK THE LETTER BY "I DON'T KNOW."

(Using your test booklet, read questions 9-16 aloud. Read each question and answer choices once. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

* * *

PROBLEM 9. ARE ALL OF THE PLANTS BELOW TREES?

A. YES, ALL OF THEM ARE TREES
B. NO, ONLY SOME OF THEM ARE TREES
C. NO, NONE OF THEM ARE TREES
D. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 12.

PROBLEM 10. ARE ALL OF THE EVERGREENS BELOW TREES?

A. NO, NONE OF THEM ARE TREES
B. YES, ALL OF THEM ARE TREES
C. NO, ONLY SOME OF THEM ARE TREES
D. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 13.

PROBLEM 11. LOOK AT ALL THE TREES AND HERBS BELOW. IF YOU PUT THEM TOGETHER IN A GROUP, THERE WOULD BE ________________ THERE ARE PLANTS.

A. FEWER OF THEM THAN
B. MORE OF THEM THAN
C. THE SAME AMOUNT OF THEM AS
D. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 14.

PROBLEM 12. ARE ALL OF THE EVERGREEN TREES BELOW DECIDUOUS TREES?

A. NO, ONLY SOME OF THEM ARE DECIDUOUS TREES
B. YES, ALL OF THEM ARE DECIDUOUS TREES
C. NO, NONE OF THEM ARE DECIDUOUS TREES
D. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 15.

PROBLEM 13. ARE ALL OF THE TREES BELOW EVERGREENS?

A. NO, NONE OF THEM ARE EVERGREENS
B. YES, ALL OF THEM ARE EVERGREENS
C. NO, ONLY SOME OF THEM ARE EVERGREENS
D. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 16.

PROBLEM 14. ARE ALL OF THE TREES BELOW PLANTS?

A. NO, ONLY SOME OF THEM ARE PLANTS
B. NO, NONE OF THEM ARE PLANTS
C. YES, ALL OF THEM ARE PLANTS
D. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 17.

PROBLEM 15. LOOK AT ALL THE EVERGREEN TREES AND DECIDUOUS TREES BELOW. IF YOU PUT THEM TOGETHER IN A GROUP, THERE WOULD BE ____________ THERE ARE TREES.

A. FEWER OF THEM THAN
B. MORE OF THEM THAN
C. THE SAME AMOUNT OF THEM AS
D. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 18.

PROBLEM 16. ARE ALL OF THE HERBS BELOW TREES?

A. NO, ONLY SOME OF THEM ARE TREES
B. YES, ALL OF THEM ARE TREES
C. NO, NONE OF THEM ARE TREES
D. I DON'T KNOW

MARK YOUR ANSWER. THIS IS THE LAST PROBLEM IN THIS BOOKLET. (Collect booklets.)

****

Directions for Booklet IVC

(For Kindergarten enter the requested identification information. Direct older students to fill in requested information.)

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Primary Instructions

TURN TO PAGE 1. IN THIS PART OF THE BOOKLET YOU ARE TO SOLVE PROBLEMS ABOUT THE DRAWINGS THAT ARE GIVEN. WE WILL DO EACH QUESTION AS WE DID BEFORE. I WILL READ EACH QUESTION AND THE DIFFERENT ANSWERS. YOU ARE TO MARK AN "X" ON THE LETTER OF THE ANSWER CHOICE THAT YOU THINK IS RIGHT. WHEN YOU DON'T KNOW THE ANSWER, MARK CHOICE E, "I DON'T KNOW." READY?

(Read questions 1-20 aloud. Read each question and the answer choices twice. For kindergarten point to each answer choice as you read it aloud. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

****

Intermediate Instructions

TURN TO PAGE 1. IN THIS PART OF THE BOOKLET YOU ARE TO SOLVE PROBLEMS ABOUT THE DRAWINGS GIVEN. FOR EACH QUESTION, YOU ARE TO SELECT THE CORRECT ANSWER. IF YOU DON'T KNOW THE CORRECT ANSWER, MARK AN "X" ON THE LETTER BY "I DON'T KNOW."

(Read questions 1-20 aloud. Read each question and the answer choices once. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

****

PROBLEM 1. SUPPOSE THAT YOU HAVE TO CHOOSE A TREE TO PLANT IN YOUR YARD. THE TREE MUST BE PLANTED WHERE IT WILL GET LITTLE WATER. TREE X HAS MANY BRANCHES, BUT FEW ROOTS. TREE Y HAS FEW BRANCHES, BUT MANY ROOTS. WHICH TREE SHOULD YOU CHOOSE?

A. TREE X
B. TREE Y
C. THEY WOULD GROW EQUALLY WELL
D. IT IS IMPOSSIBLE TO TELL
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 2.

PROBLEM 2. IMAGINE THAT YOU HAVE A LIVING APPLE TREE IN YOUR BACKYARD. IF YOU DRILLED A HOLE IN THE TRUNK, WHAT COULD YOU GET OUT OF IT?

A. WATER AND MINERALS
B. CHLOROPHYLL
C. APPLE JUICE
D. SEEDS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 3.

PROBLEM 3. IMAGINE THAT A TREE GROWER WANTS TO RAISE TREES THAT WILL PRODUCE MORE OF THEIR OWN FOOD AND THEREBY GROW FASTER. HE SHOULD CHOOSE TREES THAT PRODUCE MORE ____________________.

A. FLOWERS
B. FRUIT
C. LEAVES
D. BUDS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 4.

PROBLEM 4. SUPPOSE THAT IT IS SPRING. YOU WANT TO FIND AN APPLE TREE THAT WILL GROW MANY SEEDS BEFORE WINTER. YOU CAN PICK ONE OF MANY TREES GROWING IN AN ORCHARD. YOU SHOULD CHOOSE A TREE THAT HAS MANY ____________________.

A. LEAVES
B. ROOTS
C. FLOWERS
D. BRANCHES
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 5.

PROBLEM 5. SUPPOSE THAT YOU HAD AN APPLE TREE AND WANTED TO GROW OTHER TREES LIKE IT. WHAT WOULD YOU PLANT FROM THIS TREE?

A. THE ROOTS
B. THE SEEDS
C. THE BRANCHES
D. ANY OF THESE
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 6.

PROBLEM 6. SOME PLANTS ARE GROWING IN AN ENCLOSED GREENHOUSE WHERE THE SUPPLY OF CARBON DIOXIDE IS RUNNING LOW. WHAT MIGHT YOU BRING INTO THE GREENHOUSE TO INCREASE THE SUPPLY OF CARBON DIOXIDE?

A. SOME OTHER LIVING PLANTS
B. SOME CAGED ANIMALS
C. A BAG OF SOIL
D. BARRELS OF WATER
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 7.

PROBLEM 7. TREE X, TREE Y, AND TREE Z ARE GROWING IN YOUR BACKYARD. TREE X NEEDS MORE CARBON DIOXIDE TO GROW WELL. TREE Y NEEDS MORE CHLOROPHYLL TO GROW WELL. TREE Z NEEDS MORE MINERALS TO GROW WELL. UNDER WHICH TREE SHOULD YOU PUT WASTE PRODUCTS FROM ANIMALS?

A. TREE X
B. TREE Y
C. TREE Z
D. IT MAKES NO DIFFERENCE
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 8.

PROBLEM 8. THE LION AND THE RABBITS ARE PUT ON ISLAND X WHICH HAS NO PLANTS. THE OTHER LION IS PUT ON ISLAND Y WITH NO PLANTS AND NO OTHER ANIMALS. ON WHICH ISLAND MIGHT YOU FIND LIFE IN A YEAR?

A. ISLAND X
B. ISLAND Y
C. BOTH ISLAND X AND ISLAND Y COULD HAVE LIFE
D. NEITHER ISLAND X NOR ISLAND Y COULD HAVE LIFE
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 9.

PROBLEM 9. JAR X HAS DEAD LEAVES IN IT. JAR Y HAS A LIVING PLANT IN IT. SUPPOSE THAT YOU WERE GOING TO PUT AN INSECT AND PLENTY OF FOOD IN ONE OF THESE JARS AND SCREW THE LID ON THE JAR SO THAT NO AIR COULD GET IN OR OUT. IN WHICH JAR SHOULD YOU PUT YOUR INSECT?

A. JAR X
B. JAR Y

C. BOTH JAR X AND JAR Y WOULD BE THE SAME
D. IT IS IMPOSSIBLE TO TELL
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 10.

PROBLEM 10. IMAGINE THAT A MAN WISHES TO GROW THIS APPLE TREE. IT WOULD BE BEST FOR HIM TO PLANT THE TREE ______________.

A. IN SANDY SOIL
B. IN A MEADOW
C. IN A FOREST
D. IT MAKES NO DIFFERENCE
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 11.

PROBLEM 11. THIS TREE HAS LEAVES, BRANCHES, A TRUNK, AND ROOTS. THE WATER AND MINERALS THAT THE TREE NEEDS TO GROW ARE COLLECTED BY THE TREE'S ______________.

A. LEAVES
B. BRANCHES
C. TRUNK
D. ROOTS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 12.

PROBLEM 12. THIS TREE HAS LEAVES, FRUIT, A TRUNK, AND BARK. THE WATER, MINERALS, AND ORGANIC MATERIALS ARE TRANSPORTED BY THE TREE'S ________________.

A. LEAVES
B. FRUIT
C. TRUNK
D. BARK
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 13.

PROBLEM 13. THIS TREE HAS ROOTS, A TRUNK, BARK, AND LEAVES. THE FOOD THAT THE TREE USES IS USUALLY PRODUCED BY THE TREE'S ______________.

A. ROOTS
B. TRUNK
C. BARK
D. LEAVES
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 14.

PROBLEM 14. THIS TREE HAS ROOTS, A TRUNK, LEAVES, AND FLOWERS. THE TREE WILL FORM SEEDS FROM SPECIAL CELLS IN THE TREE'S ______________.

A. FLOWERS
B. LEAVES
C. TRUNK
D. ROOTS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 15.

PROBLEM 15. THIS TREE DEVELOPED FROM ______________.

A. A TRUNK
B. A LEAF
C. A SEED
D. A ROOT
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 16.

PROBLEM 16. THIS GREEN PLANT USES SOMETHING RELEASED BY ANIMALS LIKE THIS RABBIT. IT IS ______________.

A. HEAT
B. CARBON DIOXIDE
C. ENERGY
D. OXYGEN
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 17.

PROBLEM 17. THE DECAY OF THE WASTE PRODUCTS OF THIS AND OTHER ANIMALS SUPPLIES THIS PLANT WITH SOME OF ITS ______________.

A. MINERALS
B. VITAMINS
C. MEATY TISSUE
D. ENZYMES
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 18.

PROBLEM 18. ANIMALS LIKE THIS RABBIT THAT EAT PLANTS DEPEND DIRECTLY UPON PLANTS AS A SOURCE OF FOOD. ANIMALS LIKE THIS LION THAT EAT ONLY OTHER ANIMALS ______________.

A. DEPEND DIRECTLY UPON PLANTS AS A SOURCE OF FOOD
B. DEPEND INDIRECTLY UPON PLANTS AS A SOURCE OF FOOD
C. DO NOT DEPEND UPON PLANTS AS A SOURCE OF FOOD
D. IT IS IMPOSSIBLE TO TELL
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 19.

PROBLEM 19. ANIMALS LIKE THIS MAN AND THIS RABBIT DEPEND UPON OXYGEN IN THE AIR. THE MAJOR SOURCE OF THIS OXYGEN IS ________________.

A. ANIMALS LIKE THIS RABBIT
B. SOIL LIKE THE GROUD THE MAN IS BREAKING
C. GREEN PLANTS LIKE THIS TREE
D. CLOUDS LIKE THIS CLOUD
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 20.

PROBLEM 20. TO GROW AND PRODUCE ITS FOOD THIS TREE MUST HAVE _______________.

A. GAS, ENERGY, AND LIQUID
B. AIR, LIGHT, WATER, AND MINERALS
C. ANIMALS AND WATER
D. AIR AND WATER
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 21.

****

Primary Instructions

NOW LISTEN CAREFULLY WHILE I READ EACH QUESTION. WE WILL DO EACH QUESTION AS WE DID BEFORE, BUT THERE WILL NOT BE A DRAWING. I WILL READ EACH QUESTION AND THE DIFFERENT ANSWERS. YOU ARE TO MARK AN "X" ON THE LETTER OF THE ANSWER CHOICE THAT YOU THINK IS RIGHT. WHEN YOU DON'T KNOW THE ANSWER, MARK CHOICE E, "I DON'T KNOW." READY?

(Read questions 21-30 aloud. Read each question and the answer choices twice. For Kindergarten point to each answer choice as you read it aloud. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

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Intermediate Instructions

IN THIS SECTION YOU ARE TO LISTEN CAREFULLY WHILE I READ EACH QUESTION. WE WILL DO EACH QUESTION AS WE DID BEFORE, BUT THERE WILL NOT BE A DRAWING. FOR EACH QUESTION, YOU ARE TO SELECT THE CORRECT ANSWER. IF YOU DON'T KNOW THE CORRECT ANSWER, MARK AN "X" ON THE LETTER BY "I DON'T KNOW."

(Read questions 21-30 aloud. Read each question and the answer choices once. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

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PROBLEM 21. THE WATER AND MINERALS THAT A TREE NEEDS TO GROW AND MAKE FOOD ARE COLLECTED BY ITS _______________.

A. ROOTS
B. TRUNK

C. LEAVES
D. BRANCHES
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 22.

PROBLEM 22. WATER, MINERALS AND ORGANIC MATERIALS ARE TRANSPORTED BY THE TREE'S _______________.

A. FRUIT
B. TRUNK
C. LEAVES
D. BARK
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 23.

PROBLEM 23. THE FOOD THAT A TREE USES IN USUALLY PRODUCED BY ITS ___________.

A. ROOTS
B. TRUNK
C. LEAVES
D. BARK
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 24.

PROBLEM 24. THE SEEDS OF A TREE ARE FORMED FROM SPECIAL CELLS IN THE TREE'S _______________.

A. ROOTS
B. LEAVES
C. TRUNK
D. FLOWERS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 25.

PROBLEM 25. NEW TREES DEVELOP FROM _______________.

A. ROOTS
B. TRUNK
C. LEAVES
D. SEEDS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 26.

PROBLEM 26. GREEN PLANTS USE SOMETHING RELEASED BY ANIMALS. THIS IS _______________.

A. ENERGY
B. OXYGEN
C. CARBON DIOXIDE

D. HEAT
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 27.

PROBLEM 27. THE DECAY OF ANIMAL WASTE PRODUCTS SUPPLIES PLANTS WITH SOME OF THEIR ______________.

A. ENZYMES
B. MINERALS
C. VITAMINS
D. MEATY TISSUE
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 28.

PROBLEM 28. ANIMALS THAT EAT ONLY PLANTS DEPEND DIRECTLY UPON PLANTS AS A SOURCE OF FOOD. ANIMALS THAT EAT ONLY OTHER ANIMALS __________.

A. DO NOT DEPEND UPON PLANTS AS A SOURCE OF FOOD
B. DEPEND DIRECTLY UPON PLANTS AS A SOURCE OF FOOD
C. DEPEND INDIRECTLY UPON PLANTS AS A SOURCE OF FOOD
D. IT IS IMPOSSIBLE TO TELL
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 29.

PROBLEM 29. ALL ANIMALS DEPEND UPON OXYGEN IN THE AIR. THE MAJOR SOURCE OF THIS OXYGEN IS ______________.

A. MINERALS
B. ANIMALS
C. CLOUDS
D. GREEN PLANTS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 30.

PROBLEM 30. TO GROW AND PRODUCE FOOD A TREE REQUIRES ______________.

A. ANIMALS AND WATER
B. GAS, ENERGY, AND LIQUID
C. AIR, LIGHT, WATER, AND MINERALS
D. AIR AND WATER
E. I DON'T KNOW

MARK YOUR ANSWER. THIS IS THE LAST PROBLEM IN THIS BOOKLET. (Collect booklets.)

****

Directions for Booklet IVD

(For Kindergarten complete the requested identification information. Direct older students to fill in the identification information.)

TURN TO PAGE 1.

****

Primary Instructions for Questions 1-10

FOR THESE QUESTIONS ONE DRAWING IS DIFFERENT FROM THE OTHER THREE. LISTEN CAREFULLY WHILE I READ THE QUESTION. THEN MARK YOUR ANSWER. READY? TURN TO PAGE 1.

(Read questions 1-10 aloud. Read each question twice. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

****

Intermediate Instructions for Questions 1-10

FOR THESE QUESTIONS ONE DRAWING IS DIFFERENT IN SOME WAY FROM THE OTHER THREE DRAWINGS. TURN TO PAGE 1.

(Read questions 1-10 aloud. Read each question once. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

****

PROBLEM 1. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE THAT IS DIFFERENT FROM THE OTHER THREE.

MARK YOUR ANSWER. TURN TO PAGE 2.

PROBLEM 2. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE THAT IS DIFFERENT FROM THE OTHER THREE.

MARK YOUR ANSWER. TURN TO PAGE 3.

PROBLEM 3. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE THAT IS DIFFERENT FROM THE OTHER THREE.

MARK YOUR ANSWER. TURN TO PAGE 4.

PROBLEM 4. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE THAT IS DIFFERENT FROM THE OTHER THREE.

MARK YOUR ANSWER. TURN TO PAGE 5.

PROBLEM 5. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE THAT IS DIFFERENT FROM THE OTHER THREE.

MARK YOUR ANSWER. TURN TO PAGE 6.

PROBLEM 6. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE THAT IS DIFFERENT FROM THE OTHER THREE.

MARK YOUR ANSWER. TURN TO PAGE 7.

PROBLEM 7. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE THAT IS DIFFERENT FROM THE OTHER THREE.

MARK YOUR ANSWER. TURN TO PAGE 8.

PROBLEM 8. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE THAT CAN LIVE FOR MANY YEARS.

MARK YOUR ANSWER. TURN TO PAGE 9.

PROBLEM 9. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE WHOSE BRANCHES EXTEND IN A WHORLED PATTERN.

MARK YOUR ANSWER. TURN TO PAGE 10.

PROBLEM 10. BELOW ARE FOUR THINGS. PUT AN X ON THE ONE WHOSE LEAVES FALL AT THE END OF THE GROWING SEASON.

MARK YOUR ANSWER. TURN TO PAGE 11.

****

Primary Instructions for Questions 11-24

NOW YOU ARE TO TELL THE ANSWER THAT BEST FITS THE DRAWINGS THAT ARE ASKED ABOUT IN THE QUESTION. I WILL READ EACH QUESTION AND THE DIFFERENT ANSWERS. YOU ARE TO MARK AN "X" ON THE LETTER OF THE ANSWER CHOICE YOU THINK IS RIGHT. WHEN YOU DON'T KNOW THE ANSWER, MARK CHOICE E, "I DON'T KNOW." READY?

(Read questions 11-24 aloud. Read each question and the answer choices twice. For Kindergarten, when two groups of drawings are shown for a question, point to the group as you read it in the question. Point to each answer choice as you read it aloud. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

****

Intermediate Instructions for Questions 11-24

NOW YOU ARE TO IDENTIFY THE ANSWER THAT BEST FITS THE DRAWINGS THAT ARE INDICATED. MARK AN "X" ON THE LETTER THAT IDENTIFIES THE CORRECT ANSWER. IF YOU DON'T KNOW THE CORRECT ANSWER, MARK AN "X" ON THE LETTER BY "I DON'T KNOW."

(Read aloud questions 11-24. Read each question once. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

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PROBLEM 11. WHICH ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. FLOWERS
B. TREES
C. GREEN PLANTS
D. HERBS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 12.

PROBLEM 12. WHAT ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. EVERGREENS
B. NEEDLES
C. TREES
D. SHRUBS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 13.

PROBLEM 13. WHICH ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. SEEDS
B. ROOTS
C. BRANCHES
D. STEMS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 14.

PROBLEM 14. WHAT ONE WORD BEST INDICATES WHAT THE ARROW IS POINTING AT?

A. FLOWERS
B. LEAVES
C. BARKS
D. ROOTS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 15.

PROBLEM 15. WHAT ONE WORD BEST INDICATES WHAT THE ARROW IS POINTING AT?

A. ROD
B. STICK
C. STEM
D. POLE
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 16.

PROBLEM 16. ABOVE ARE TWO GROUPS OF STEMS. WHAT ONE NAME BEST FITS ALL OF THE STEMS IN GROUP 1 BUT DOES NOT FIT ALL THE STEMS IN GROUP 2?

A. HOLLOW STEMS
B. WOODY STEMS
C. FLAT STEMS
D. FLOWERING STEMS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 17.

PROBLEM 17. WHAT ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. LEAVES
B. STEMS
C. ROOTS
D. BARK
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 18.

PROBLEM 18. THE PLANTS IN GROUP 1 LIVE FOR MANY YEARS. THE PLANTS IN GROUP 2 DIE AT THE END OF THE GROWING SEASON. WHAT ONE NAME BEST FITS ALL OF THE PLANTS IN GROUP 1 BUT DOES NOT FIT ALL OF THE PLANTS IN GROUP 2?

A. CENTENNIALS
B. PERENNIALS
C. DIURNALS
D. PERPETUALS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 19.

PROBLEM 19. WHAT ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. VASCULAR TREES
B. CELLULOSE TREES
C. HERBACEOUS TREES
D. DECIDUOUS TREES
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 20.

PROBLEM 20. WHAT ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. GEOTROPIC ALPINE TREES
B. PHOTOSYNTHETIC TREES
C. CONIFEROUS EVERGREEN TREES
D. ANNUAL TREES
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 21.

PROBLEM 21. WHAT ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. RIPE LEAVES
B. MINERAL LEAVES
C. BROAD LEAVES
D. CURLED LEAVES
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 22.

PROBLEM 22. WHAT ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. SPRING LEAVES
B. NEEDLES
C. BLOSSOM LEAVES
D. POINTS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 23.

PROBLEM 23. WHAT ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. SPROUTS
B. FRUIT
C. ORNAMENTS
D. FLOWERS
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 24.

PROBLEM 24. WHAT ONE NAME BEST FITS ALL OF THE THINGS IN GROUP 1 BUT DOES NOT FIT ALL OF THE THINGS IN GROUP 2?

A. ACORNS
B. CONES
C. NUTS
D. FRUIT
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 25.

****

Primary Instructions for Questions 25-34

NOW YOU ARE TO MARK THE ANSWER THAT TELLS HOW "THING X" IS DIFFERENT FROM ALL THE OTHER THINGS. I WILL READ EACH QUESTION AND THE DIFFERENT ANSWERS. YOU ARE TO MARK AN "X" ON THE LETTER OF THE CHOICE YOU THINK IS RIGHT. WHEN YOU DON'T KNOW THE ANSWER, MARK CHOICE E, "I DON'T KNOW." READY?

(Read aloud questions 25-34. Read each question twice. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

****

Intermediate Instructions for Questions 24-34

NOW YOU ARE TO MARK THE ANSWER THAT TELLS HOW "THING X" IS DIFFERENT FROM ALL THE OTHER THINGS. I WILL READ EACH QUESTION AND THE DIFFERENT ANSWERS. YOU ARE TO MARK AN "X" ON THE LETTER OF THE CHOICE YOU THINK IS RIGHT. WHEN YOU DON'T KNOW THE ANSWER, MARK CHOICE E, "I DON'T KNOW." READY?

(Read aloud questions 25-34. Read each question once. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

****

PROBLEM 25. THING X IS DIFFERENT FROM ALL OF THE OTHER THINGS IN SOME WAY. HOW IS IT DIFFERENT?

A. ONLY THING X IS ALIVE.
B. ONLY THING X NEEDS FOOD TO LIVE.
C. ONLY THING X HAS ROOTS
D. ONLY THING X CAN MAKE LIGHT.
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 26.

PROBLEM 26. THING X IS DIFFERENT FROM ALL OF THE OTHER THINGS IN SOME WAY. HOW IS IT DIFFERENT?

A. ONLY THING X CAN BE USED FOR FOOD.
B. ONLY THING X USES LIGHT.
C. ONLY THING X HAS LEGS.
D. ONLY THING X HAS LEAVES.
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 27.

PROBLEM 27. THING X IS DIFFERENT FROM ALL OF THE OTHER THINGS IN SOME WAY. HOW IS IT DIFFERENT?

A. ONLY THING X HAS SEEDS.
B. ONLY THING X HAS SKIN.
C. ONLY THING X NEEDS AIR.
D. ONLY THING X NEEDS WATER.
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 28.

PROBLEM 28. PLANT X IS DIFFERENT FROM ALL OF THE OTHER PLANTS IN SOME WAY. HOW IS IT DIFFERENT?

A. ONLY PLANT X HAS A STEM.

B. ONLY PLANT X HAS ROOTS.
C. ONLY PLANT X HAS MANY MAIN STEMS.
D. ONLY PLANT X HAS A SINGLE MAIN STEM.
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 29.

PROBLEM 29. PLANT X IS DIFFERENT FROM ALL OF THE OTHER PLANTS IN SOME WAY. HOW IS IT DIFFERENT?

A. ONLY PLANT X HAS A SMOOTH STEM.
B. ONLY PLANT X HAS A WOODY STEM.
C. ONLY PLANT X HAS A LIVING STEM.
D. ONLY PLANT X HAS A STEM THAT TRANSPORTS WATER.
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 30.

PROBLEM 30. PLANT X IS DIFFERENT FROM ALL OF THE OTHER PLANTS IN SOME WAY. HOW IS IT DIFFERENT?

A. ONLY PLANT X CAN LIVE THROUGH A HOT SUMMER.
B. ONLY PLANT X STOPS GROWING AFTER ONE YEAR.
C. ONLY PLANT X CAN LIVE FOR MANY YEARS.
D. ONLY PLANT X CAN LIVE THROUGH A WET SPRING.
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 31.

PROBLEM 31. THE THINGS IN GROUP X ARE DIFFERENT FROM THE THINGS IN GROUP Y IN A CERTAIN WAY. HOW ARE THEY DIFFERENT?

A. THE THINGS IN GROUP X NEED EITHER AIR OR LIGHT.
B. THE THINGS IN GROUP X NEED EITHER FOOD OR WATER.
C. THE THINGS IN GROUP X HAVE EITHER BROAD LEAVES OR NEEDLES.
D. THE THINGS IN GROUP X HAVE EITHER TEETH OR LEGS.
E. I DON'T KNOW.

MARK YOUR ANSWER. TURN TO PAGE 32.

PROBLEM 32. THE THINGS IN GROUP X ARE DIFFERENT FROM THE THINGS IN GROUP Y IN A CERTAIN WAY. HOW ARE THEY DIFFERENT?

A. THE THINGS IN GROUP X HAVE EITHER CONES OR FLOWERS.
B. THE THINGS IN GROUP X ARE EITHER TALL OR SHORT.
C. THE THINGS IN GROUP X ARE EITHER METAL OR STONE.
D. THE THINGS IN GROUP X HAVE EITHER MASS OR ENERGY.
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 33.

PROBLEM 33. THE THINGS IN GROUP X ARE DIFFERENT FROM THE THINGS IN GROUP Y IN A CERTAIN WAY. HOW ARE THEY DIFFERENT?

A. THE THINGS IN GROUP X ARE FAST, SLOW, OR DO NOT MOVE AT ALL.
B. THE THINGS IN GROUP X ARE FOUND IN WATER, IN VALLEYS, OR ON MOUNTAINS.
C. THE THINGS IN GROUP X HAVE LEAVES THAT DEVELOP INTO FLOWERS, SEEDS, OR FRUIT.
D. THE THINGS IN GROUP X HAVE BRANCHES THAT EXTEND IN AN ALTERNATE, AN OPPOSITE, OR A WHORLED PATTERN.
E. I DON'T KNOW

MARK YOUR ANSWER. TURN TO PAGE 34.

PROBLEM 34. THE THINGS IN GROUP X ARE DIFFERENT FROM THE THINGS IN GROUP Y IN A CERTAIN WAY. HOW ARE THEY DIFFERENT?

A. THE THINGS IN GROUP X EITHER NEED OR PRODUCE LIGHT.
B. THE THINGS IN GROUP X HAVE LEAVES THAT EITHER FALL AT THE END OF THE GROWING SEASON OR MAY FALL AT ANY TIME THROUGHOUT THE SEASON.
C. THE THINGS IN GROUP X HAVE FLOWERS THAT BLOSSOM IN EITHER SPRING OR SUMMER.
D. THE THINGS IN GROUP X HAVE EITHER WOOD OR ENERGY.
E. I DON'T KNOW.

MARK YOUR ANSWER. TURN TO PAGE 35.

* * *

Primary and Intermediate Instructions for Question 35

LISTEN CAREFULLY WHILE I READ THIS QUESTION. MARK THE LETTER OF THE ANSWER CHOICE THAT YOU THINK IS RIGHT. WHEN YOU DON'T KNOW THE ANSWER, MARK CHOICE E, "I DON'T KNOW." READY?

(Read question 35 aloud. Read it twice for primary test administrations. Read it once for intermediate test administrations. For kindergarten point to each answer choice as you read it aloud. Pace students through the items. Wait until all students have completed an item before proceeding to the next item. Check to see that all students are on the right page.)

* * *

PROBLEM 35. WHICH OF THE FOLLOWING IS THE DEFINITION OF TREE?

A. ANY LIVING THING WITH LEAVES
B. A PLANT THAT LIVES FOR MANY YEARS AND HAS A SINGLE MAIN STEM THAT IS WOODY
C. A PLANT THAT LIVES ONE YEAR AND HAS A SINGLE MAIN STEM THAT IS NONWOODY
D. ANY PLANT THAT GROWS WELL IN A FOREST
E. I DON'T KNOW

MARK YOUR ANSWER. THIS IS THE LAST PROBLEM IN THIS BOOKLET. (Collect booklets.)

V

TEST BATTERY

A

Name ______________________________ Birthdate ______________________________
Last First Middle Month Day Year

School ______________________ Grade ______ Today's Date ________________

Sex F M

Conceptual Learning and Development Assessment Series IV (A)

Marliave, R. S., Klausmeier, H. J., Katzenmeyer, C. G., and Sipple, T. S.

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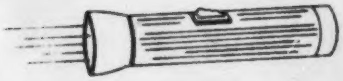

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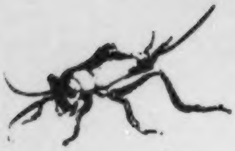
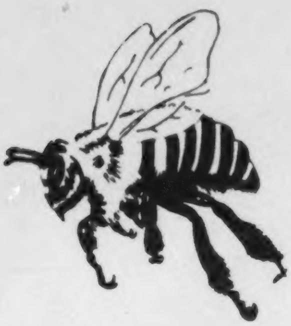
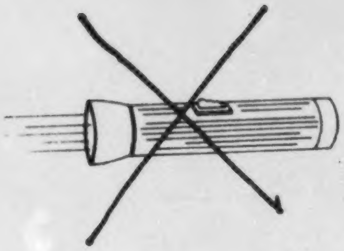
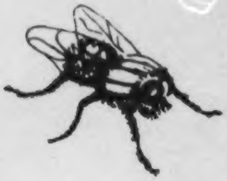

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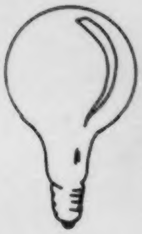

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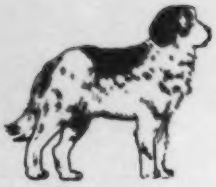

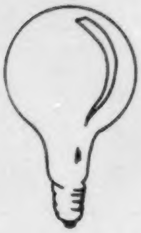

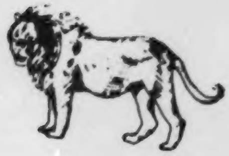

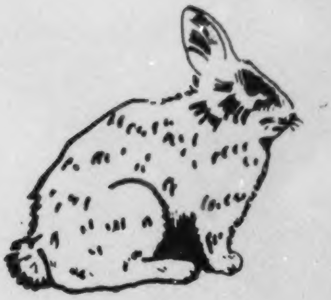

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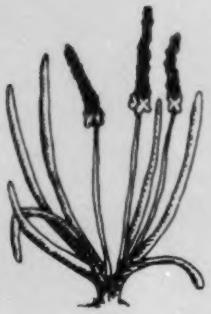

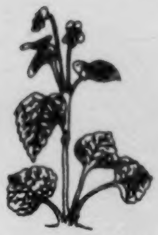

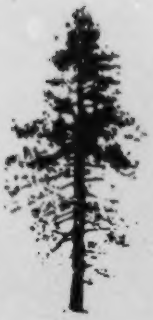

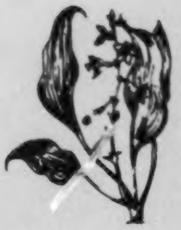

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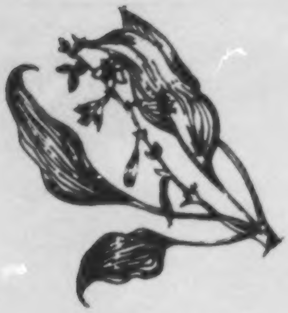

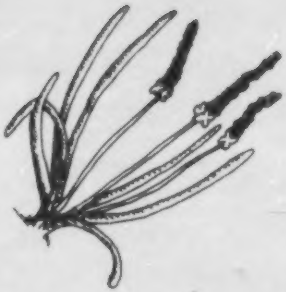

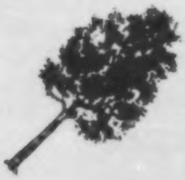

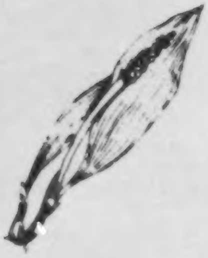

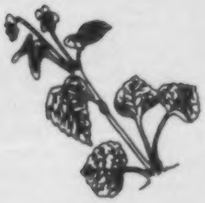

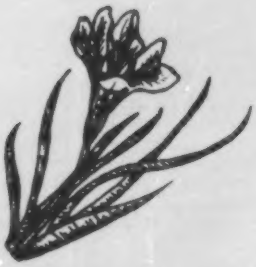

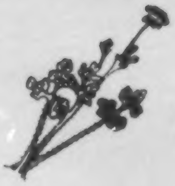

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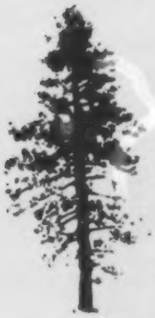

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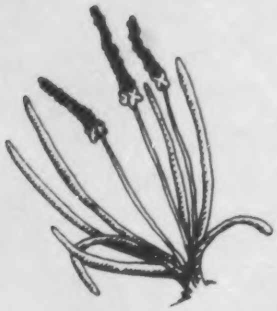

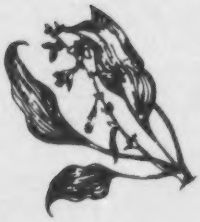

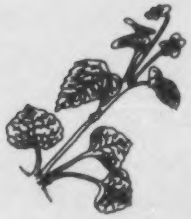

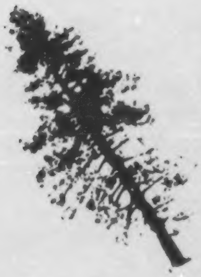

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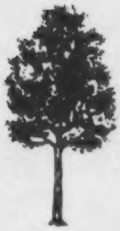

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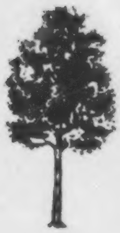

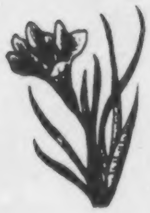

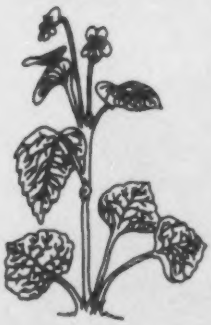

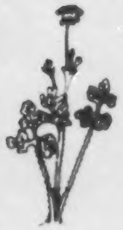

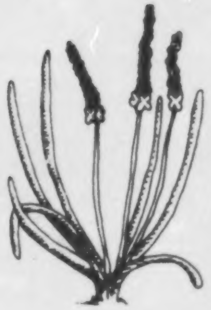

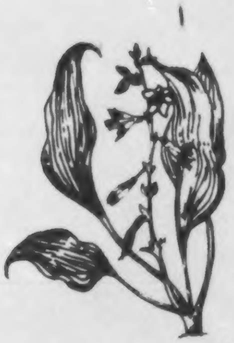

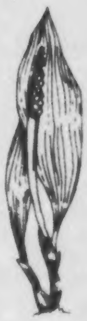

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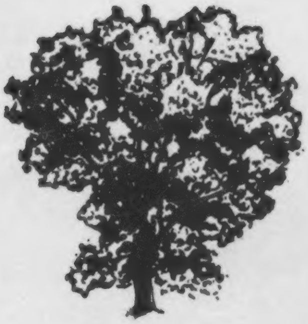

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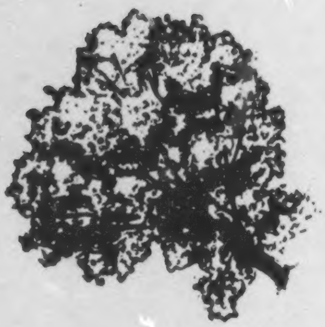

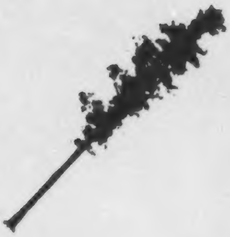

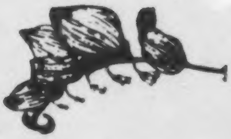

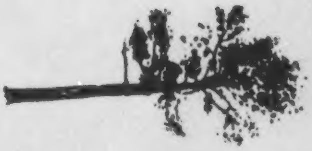

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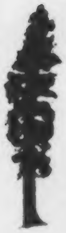

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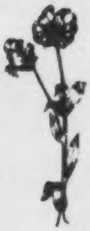
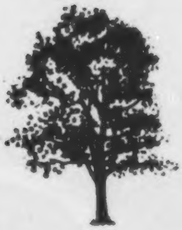
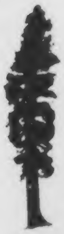

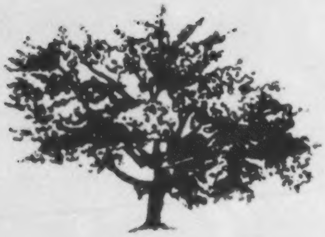
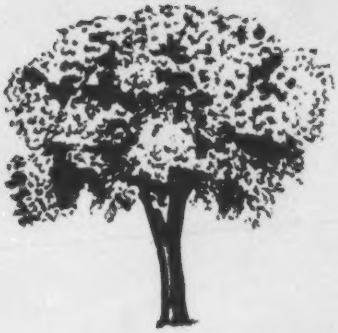
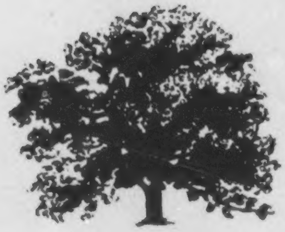
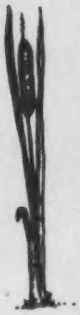

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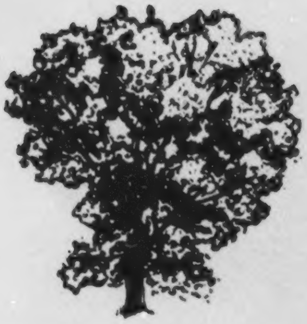
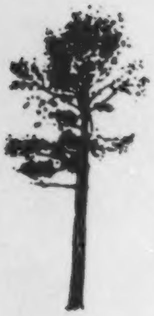
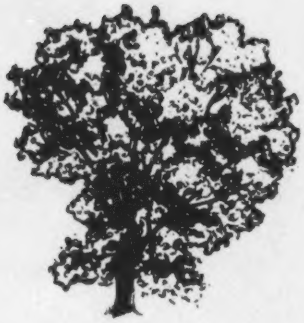
7a.

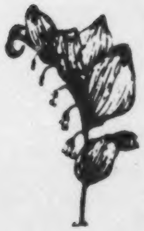


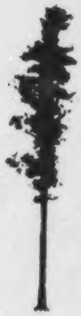
Stop

7b.







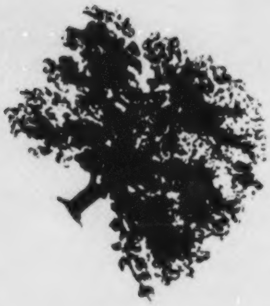


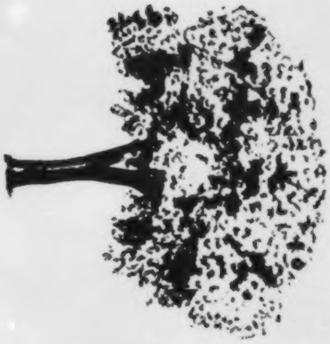
Stop

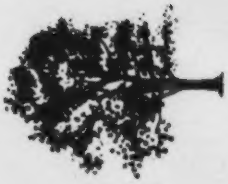
8a.

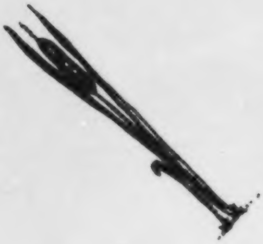
Stop

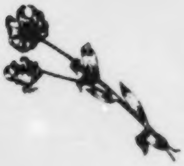
8b.

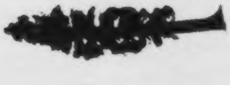


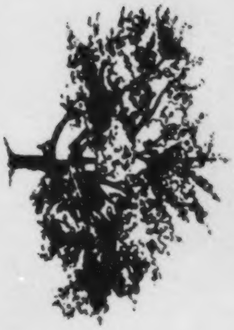












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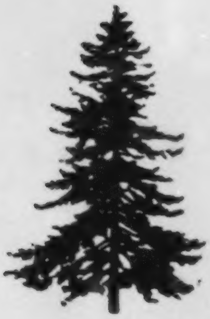
9a.



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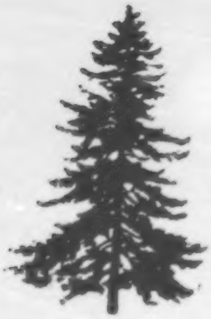
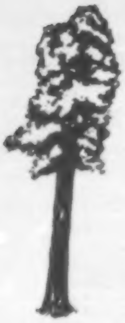
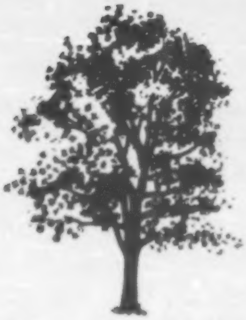
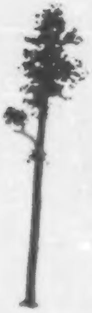
9b.









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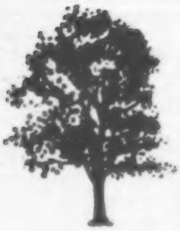
10a.



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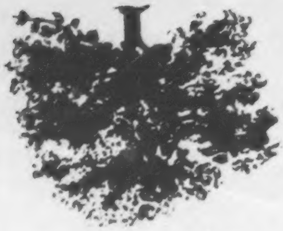
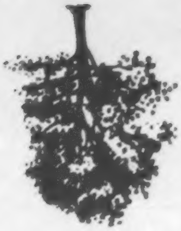
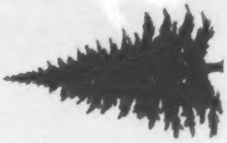
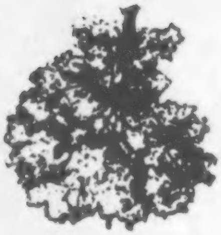
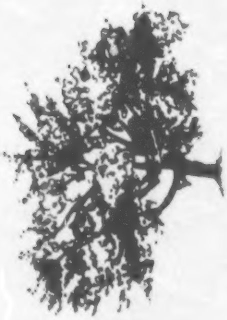
10b.

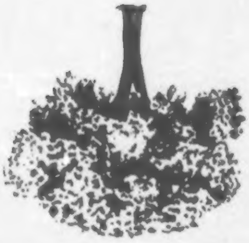












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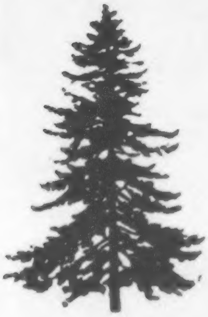
11a.



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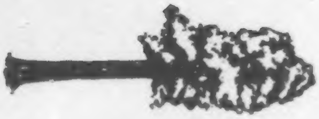
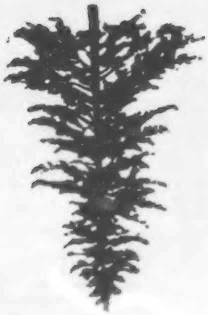
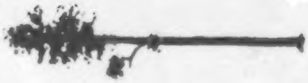
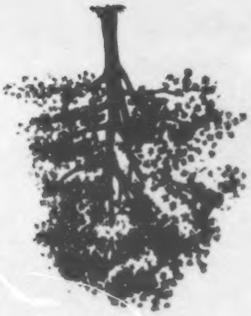
11b.









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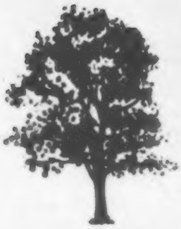

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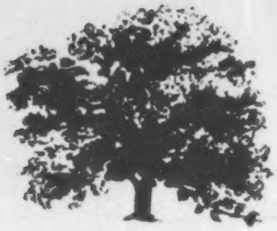
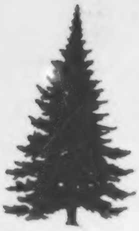
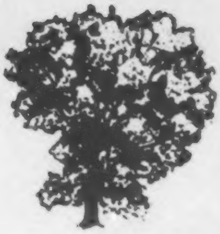
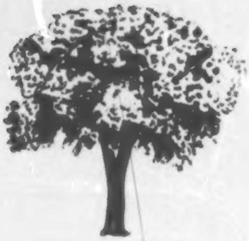
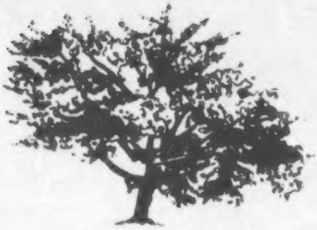
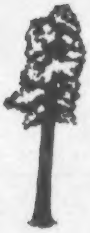
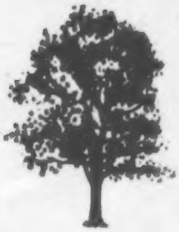
12b.

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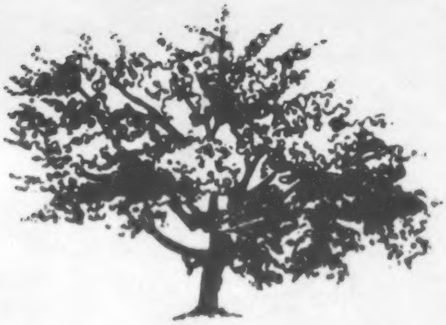
13a.



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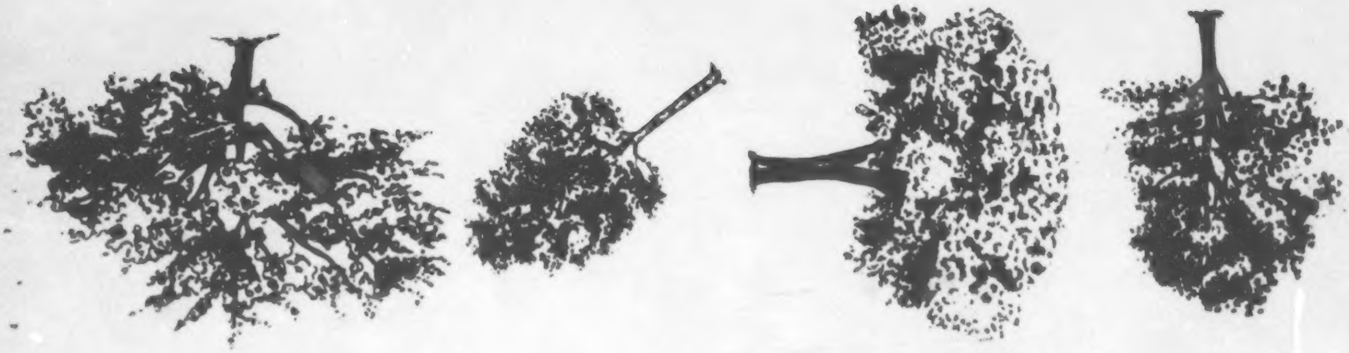
GPO 806-294-6

13b.



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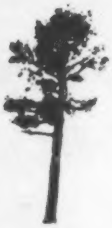
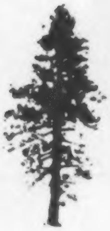
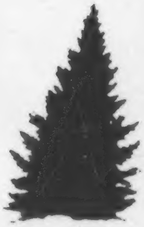
14a.

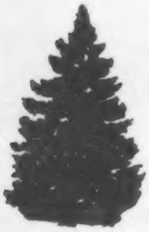
Stop

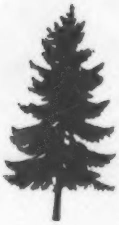
14b.

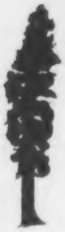












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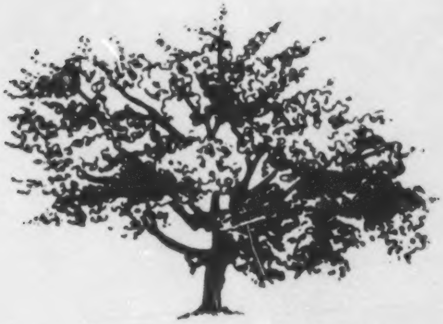
15a.



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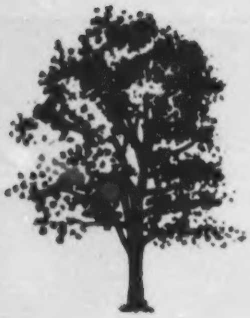
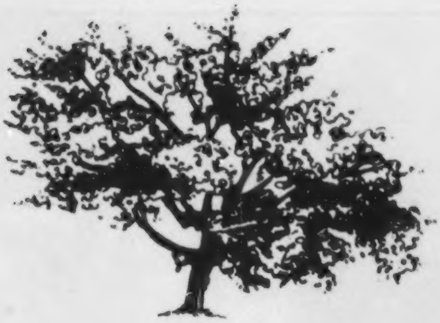
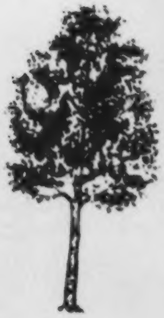
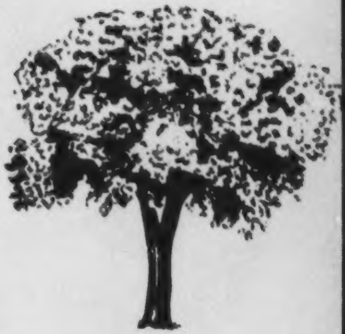
15b.









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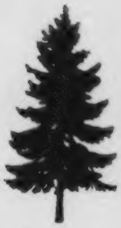
16a.



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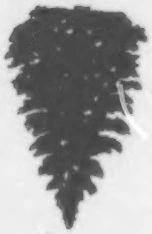
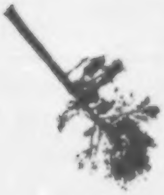
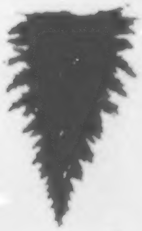
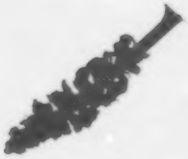
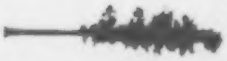
16b.

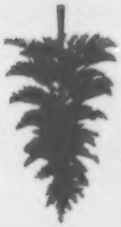












Stop

B

NAME ______________________________

Conceptual Learning and Development Assessment Series IV (B)

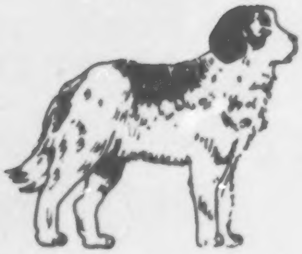
Marliave, R. S., Klausmeier, H. J., Katzenmeyer, C. G., and Sipple, T. S.

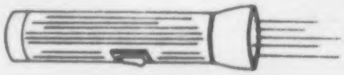
DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO

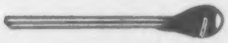
84

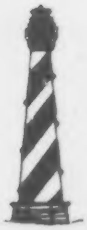
1

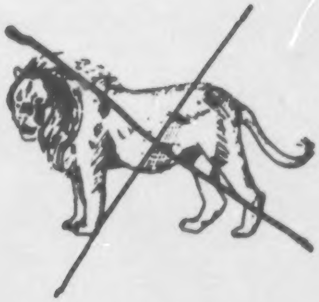
A. The thing on the left is alive. Put an X on the thing on the right that is also alive.







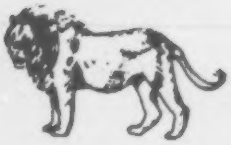


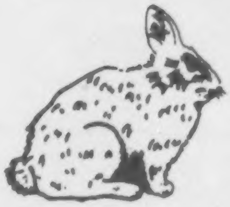


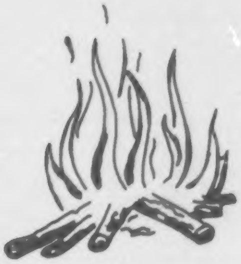
Stop

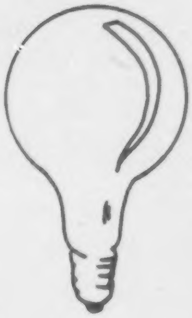
2

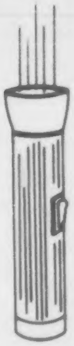
B. The thing on the left is alive. Put an X on the thing on the right that is also alive.





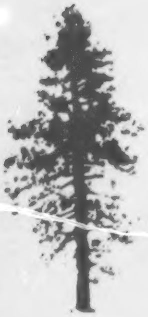


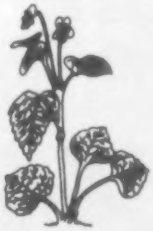


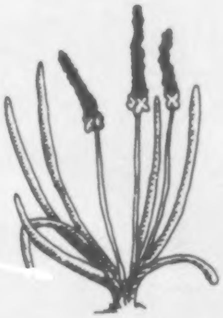


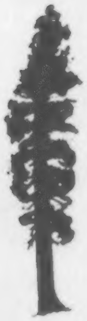
Stop

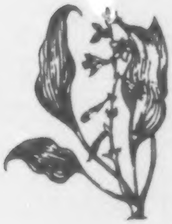
1. The thing on the left has a certain kind of stem. Put an X on the thing on the right that has the same kind of stem.





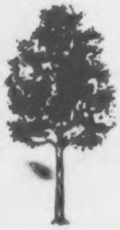


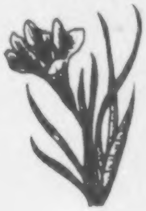


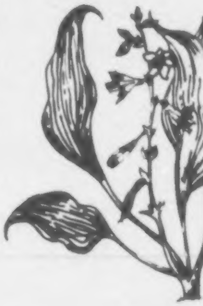


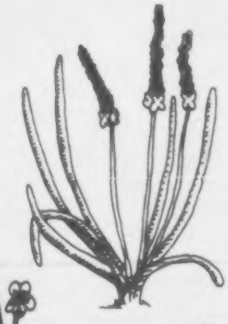
Stop

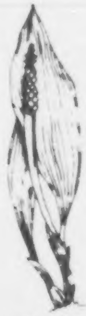
2. The thing on the left has a certain kind of stem. Put an X on the thing on the right that has the same kind of stem.

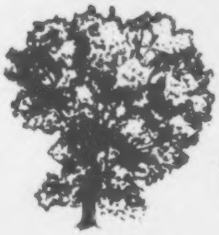


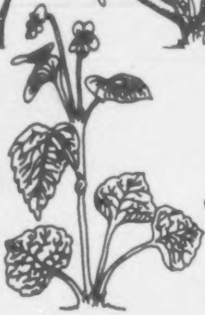


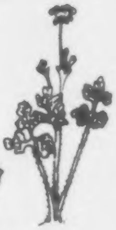






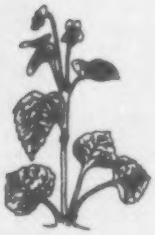
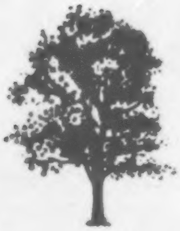
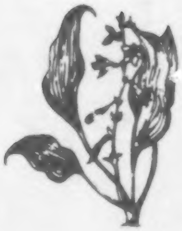
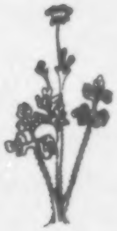
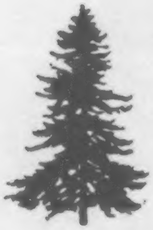






Stop

3. Put an X on each of the things below that have woody stems.

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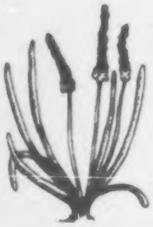
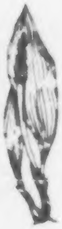
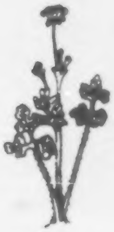
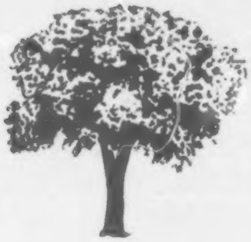
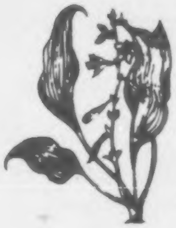
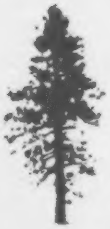
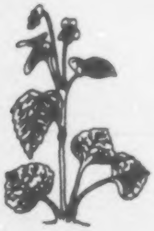
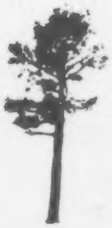
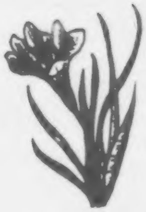
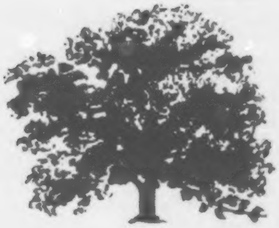
4. Put an X on each of the things below that have woody stems.

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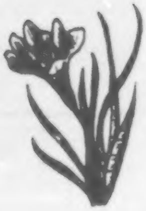
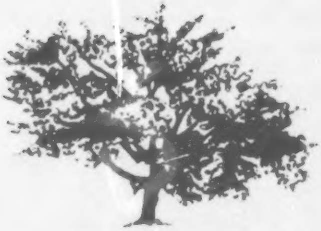
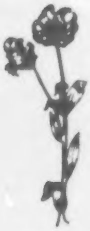
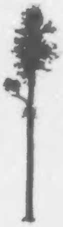
5. Put an X on each of the things below that have woody stems.



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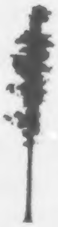
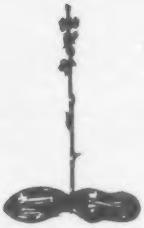
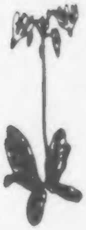
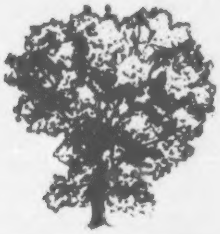
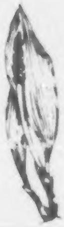
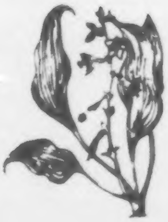
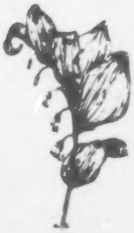
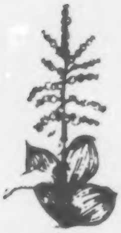
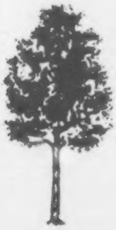
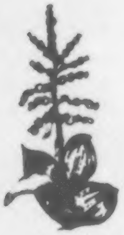
6. Put an X on each of the things below that have woody stems.

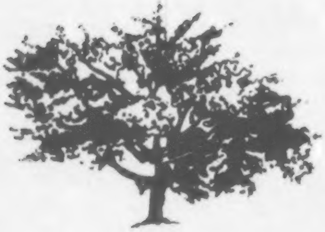







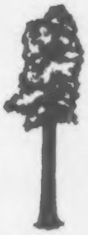




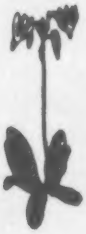
Stop

7. Put an X on each of the things below that have woody stems.



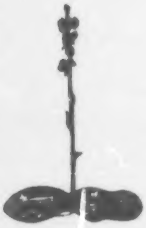


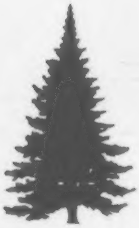


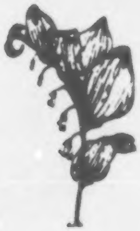


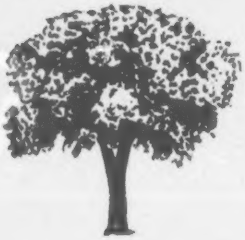
Stop

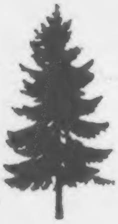
8. Put an X on each of the things below that have woody stems.

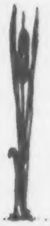


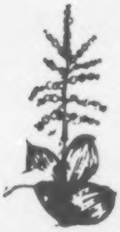


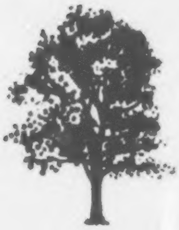


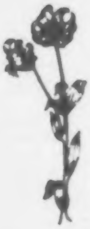


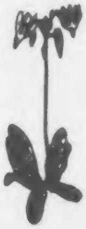






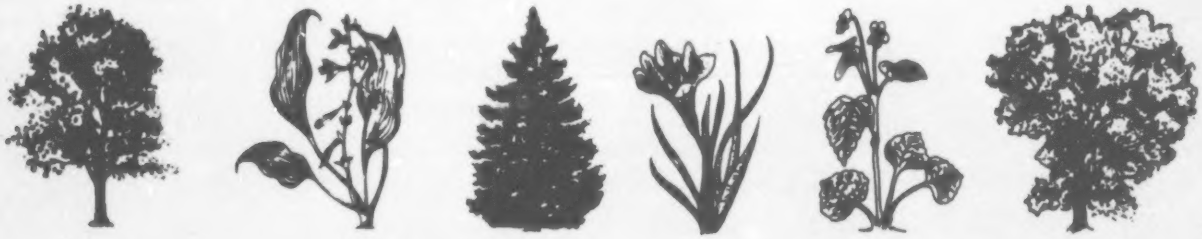






Stop

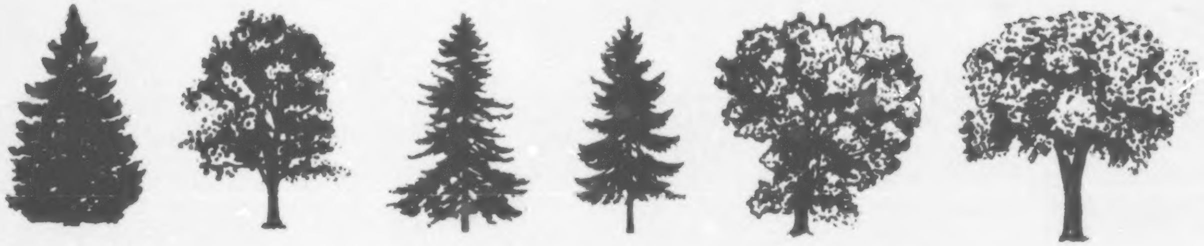
9. Are all of the plants below trees?



a. yes, all of them are trees
b. no, only some of them are trees
c. no, none of them are trees
d. I don't know

Stop

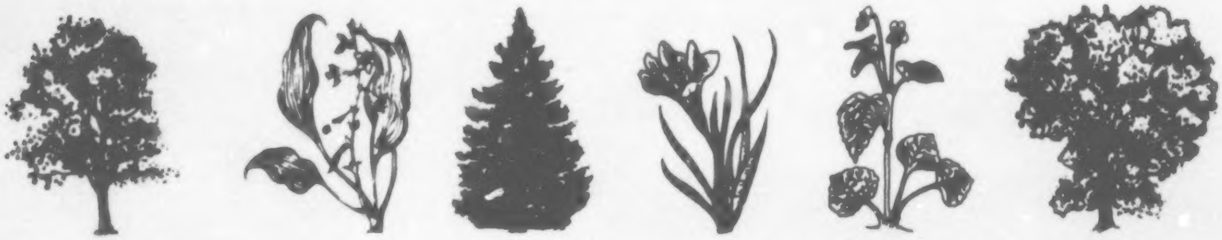
10. Are all of the evergreens below trees?



a. no, none of them are trees
b. yes, all of them are trees
c. no, only some of them are trees
d. I don't know

Stop

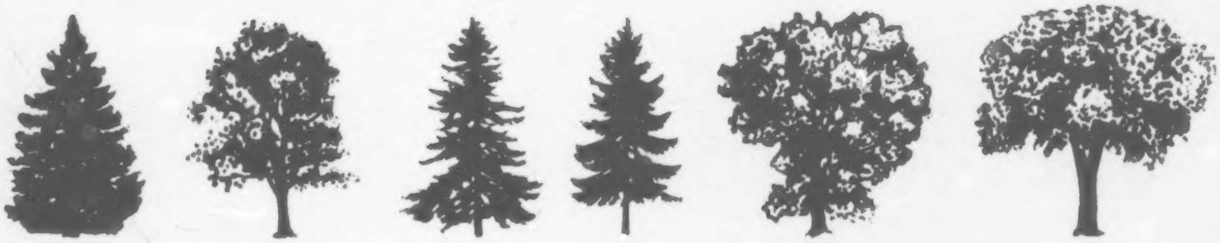
11. Look at all the trees and herbs below. If you put them together in a group, there would be __________ there are plants.



a. fewer of them than
b. more of them than
c. the same amount of them as
d. I don't know

Stop

12. Are all of the evergreen trees below deciduous trees?

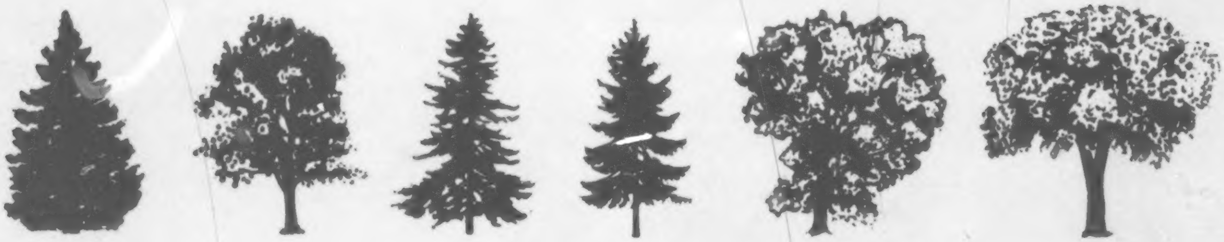


a. no, only some of them are deciduous trees
b. yes, all of them are deciduous trees
c. no, none of them are deciduous trees
d. I don't know

Stop

GPO 896-294-7

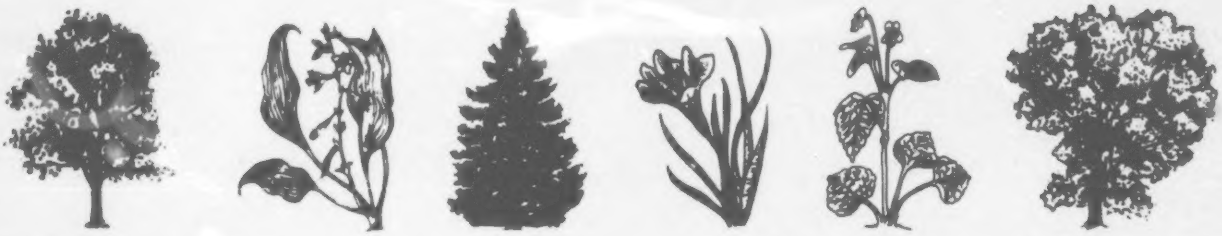
13. Are all of the trees below evergreens?



a. no, none of them are evergreens
b. yes, all of them are evergreens
c. no, only some of them are evergreens
d. I don't know

Stop

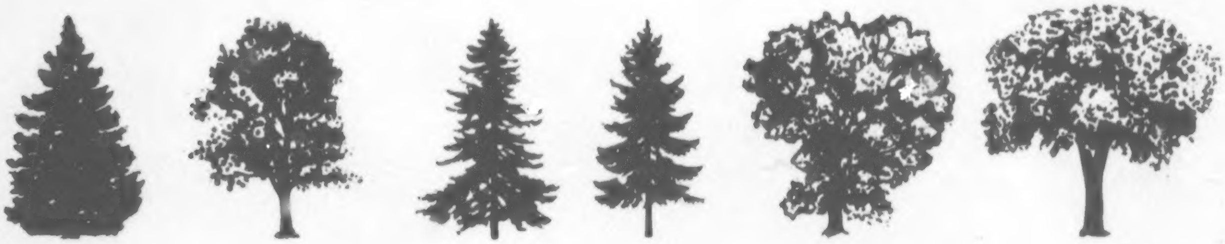
14. Are all of the trees below plants?



a. no, only some of them are plants
b. no, none of them are plants
c. yes, all of them are plants
d. I don't know

Stop

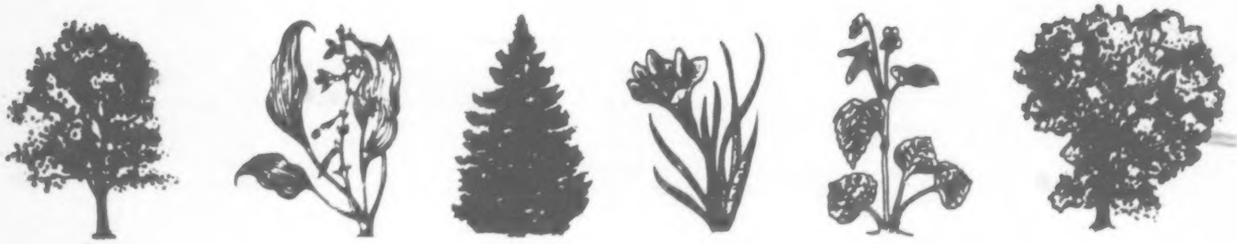
15. Look at all the evergreen trees and deciduous trees below. If you put them together in a group, there would be ______ there are trees.



a. fewer of them than
b. more of them than
c. the same amount of them as
d. I don't know

Stop

16. Are all of the herbs below trees?



a. no, only some of them are trees
b. yes, all of them are trees
c. no, none of them are trees
d. I don't know

Stop

C

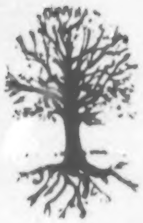
NAME ________________________________

Conceptual Learning and Development Assessment Series IV (C)

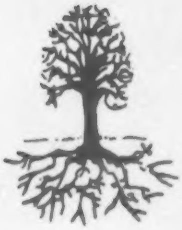
Marliave, R. S., Klausmeier, H. J., Katzenmeyer, C. G., and Sipple, T. S.

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO

1.



Tree X



Tree Y

Suppose that you have to choose a tree to plant in your yard. The tree must be planted where it will get little water. Tree X has many branches, but few roots. Tree Y has few branches, but many roots. Which tree should you choose?

a. Tree X
b. Tree Y
c. They would grow equally well
d. It is impossible to tell
e. I don't know

Stop

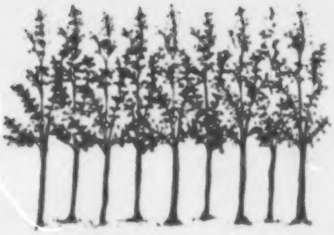
2.

Imagine that you have an apple tree in your backyard. If you drilled a hole in the trunk, what could you get out of it?

a. water and minerals
b. chlorophyll
c. apple juice
d. seeds
e. I don't know

Stop

3.

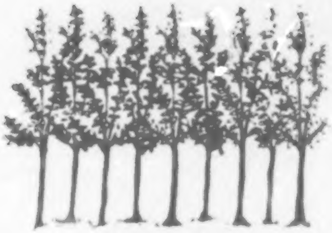


Imagine that a tree grower wants to raise trees that will produce more of their own food and thereby grow faster. He should choose trees that produce more ______________.

a. flowers
b. fruit
c. leaves
d. buds
e. I don't know

Stop

4.



Suppose that it is spring. You want to find an apple tree that will grow many seeds before winter. You can pick one of many trees growing in an orchard. You should choose a tree that has many ______________.

a. leaves
b. roots
c. flowers
d. branches
e. I don't know

Stop

5

5.

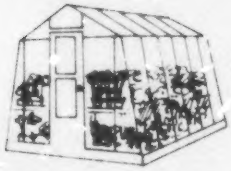
Suppose that you had an apple tree and wanted to grow other trees like it. What would you plant from this tree?

a. the roots
b. the seeds
c. the branches
d. any of these
e. I don't know

Stop

6

6.

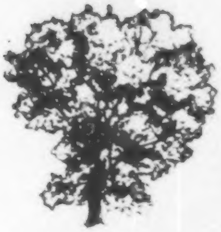


Some plants are growing in an enclosed greenhouse where the supply of carbon dioxide is running low. What might you bring into the greenhouse to increase the supply of carbon dioxide?

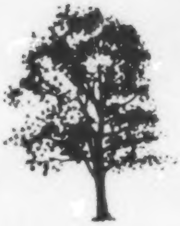
a. some other living plants
b. some caged animals
c. a bag of soil
d. barrels of water
e. I don't know

Stop

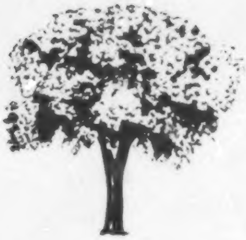
7.



Tree X



Tree Y



Tree Z

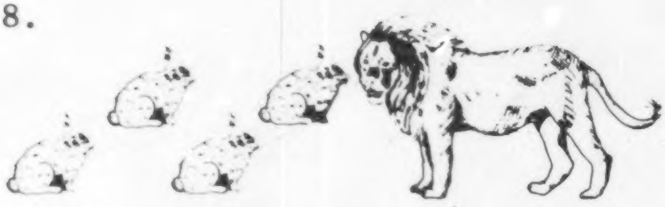
Tree X, Tree Y, and Tree Z are growing in your backyard. Tree X needs to have more carbon dioxide to grow well. Tree Y needs to have more chlorophyll to grow well. Tree Z needs to have more minerals to grow well. Under which tree should you put waste products from animals?

a. Tree X
b. Tree Y
c. Tree Z
d. It makes no difference
e. I don't know

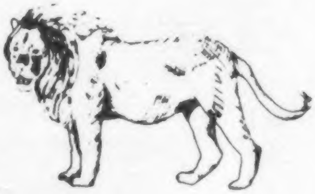
Stop

8

8.



Island X



Island Y

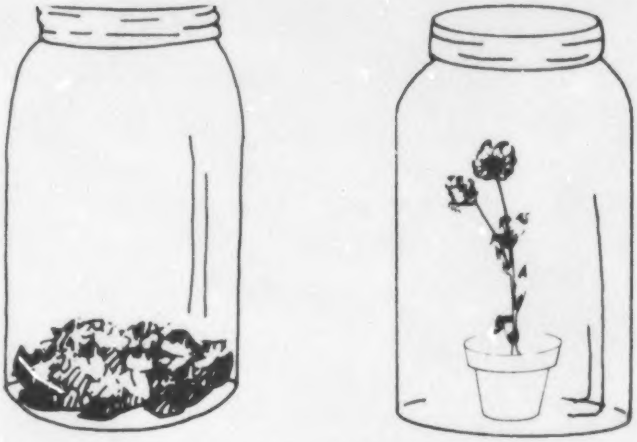
The lion and the rabbits are put on island X which has no plants. The other lion is put on island Y with no plants and no other animals. On which island might you find life in a year?

a. island X
b. island Y
c. both island X and island Y could have life
d. neither island X nor island Y could have life
e. I don't know

Stop

9

9.



Jar X has dead leaves in it. Jar Y has a living plant in it. Suppose that you were going to put an insect and plenty of food in one of these jars and screw the lid on the jar so that no air could get in or out. In which jar should you put your insect?

a. Jar X
b. Jar Y
c. Both Jar X and Jar Y would be the same
d. It is impossible to tell
e. I don't know

Stop

10

10.

Imagine that a man wishes to grow this apple tree. It would be best for him to plant the tree _______.

a. in sandy soil
b. in a meadow
c. in a forest
d. It makes no difference
e. I don't know

11.

This tree has leaves, branches, a trunk, and roots. The water and minerals that the tree needs to grow are collected by the tree's ____________.

a. leaves
b. branches
c. trunk
d. roots
e. I don't know

Stop

12.

This tree has leaves, fruit, a trunk, and bark. The water, minerals, and organic materials are transported by the tree's

_______________.

a. leaves
b. fruit
c. trunk
d. bark
e. I don't know

Stop

13.

This tree has roots, a trunk, bark, and leaves. The food that the tree uses is usually produced by the tree's ______.

a. roots
b. trunk
c. bark
d. leaves
e. I don't know

Stop

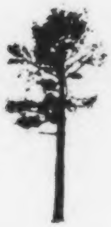
14.

This tree has roots, a trunk, leaves, and flowers. The tree will form seeds from special cells in the tree's ________.

a. flowers
b. leaves
c. trunk
d. roots
e. I don't know

Stop

15.

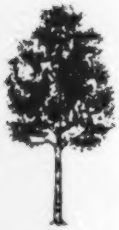


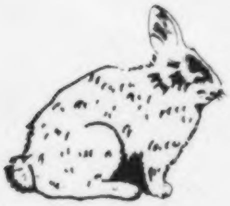
This tree developed from ______________.

a. a trunk
b. a leaf
c. a seed
d. a root
e. I don't know

Stop

16.





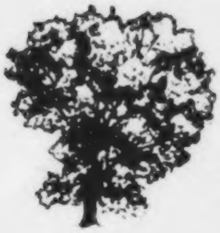
This green plant uses something released by animals like this rabbit. It is ________________.

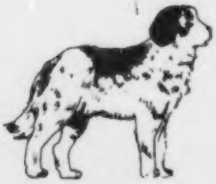
a. heat
b. carbon dioxide
c. energy
d. oxygen
e. I don't know

Stop

17

17.





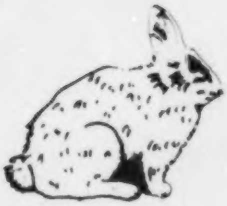
The decay of the waste products of this and other animals supplies this plant with some of its ____________________.

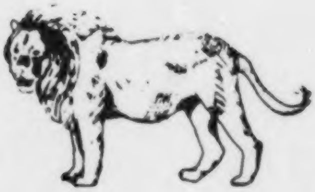
a. minerals
b. vitamins
c. meaty tissue
d. enzymes
e. I don't know

Stop

18

18.



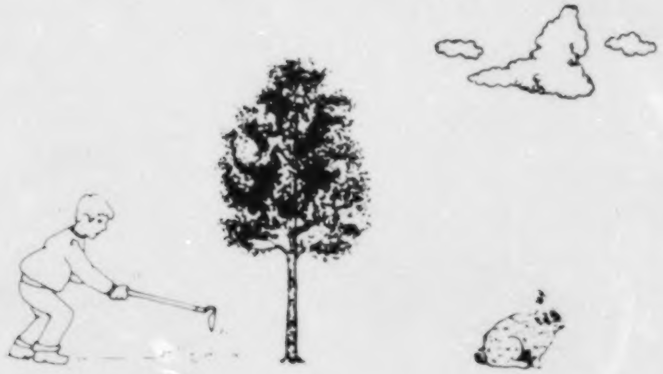


Animals like this rabbit that eat plants depend directly upon plants as a source of food. Animals like this lion that eat only other animals _____________.

a. depend directly upon plants as a source of food
b. depend indirectly upon plants as a source of food
c. do not depend upon plants as a source of food
d. It is impossible to tell
e. I don't know

Stop

19.

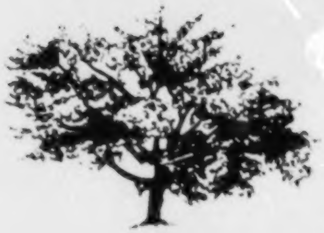


Animals like this man and this rabbit depend upon oxygen in the air. The major source of this oxygen is ___________.

a. animals like this rabbit
b. soil like the ground the man is breaking
c. green plants like this tree
d. clouds like this cloud
e. I don't know

Stop

20.



To grow and produce its food this tree must have ________.

a. gas, energy, and liquid
b. air, light, water, and minerals
c. animals and water
d. air and water
e. I don't know

Stop

21

21. The water and minerals that a tree needs to grow and make food are collected by its ___________.

a. roots
b. trunk
c. leaves
d. branches
e. I don't know

Stop

22

22. Water, minerals and organic materials are transported by the tree's ____________.

a. fruit
b. trunk
c. leaves
d. bark
e. I don't know

Stop

23

23. The food that a tree uses is usually produced by its __________.

a. roots
b. trunk
c. leaves
d. bark
e. I don't know

Stop

24

24. The seeds of a tree are formed from special cells in the tree's ____________.

a. roots
b. leaves
c. trunk
d. flowers
e. I don't know

Stop

25. New trees develop from ____________.

a. roots
b. trunk
c. leaves
d. seeds
e. I don't know

Stop

26. Green plants use something released by animals. This is ____________.

a. energy
b. oxygen
c. carbon dioxide
d. heat
e. I don't know

Stop

27

27. The decay of animal waste products supplies plants with some of their _____________.

a. enzymes
b. minerals
c. vitamins
d. meaty tissue
e. I don't know

Stop

28

28. Animals that eat only plants depend directly upon plants as a source of food. Animals that eat only other animals ________.

a. do not depend upon plants as a source of food
b. depend directly upon plants as a source of food
c. depend indirectly upon plants as a source of food
d. It is impossible to tell
e. I don't know

Stop

29. All animals depend upon oxygen in the air. The major source of this oxygen is ___________.

a. minerals
b. animals
c. clouds
d. green plants
e. I don't know

Stop

30. To grow and produce food a tree requires _____________.

a. animals and water
b. gas, energy, and liquid
c. air, light, water, and minerals
d. air and water
e. I don't know

Stop

D

NAME ______________________________

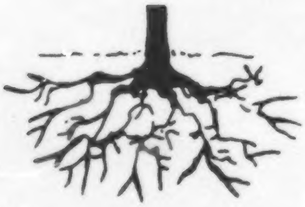
Conceptual Learning and Development Assessment Series IV (D)

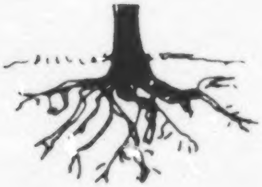
Marliave, R. S., Klausmeier, H. J., Katzenmeyer, C. G., and Sipple, T. S.

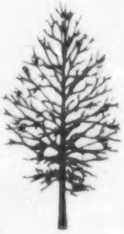
DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO

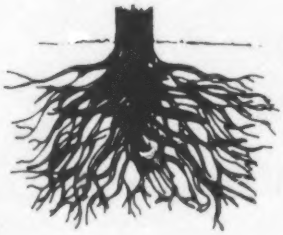
1

1. Below are four things. Put an X on the one that is different from the other three.





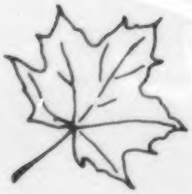


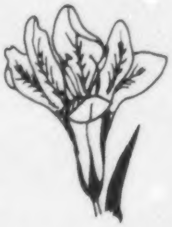


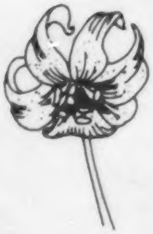
Stop

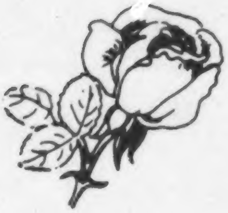
2

2. Below are four things. Put an X on the one that is different from the other three.









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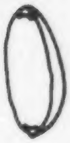

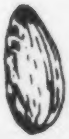

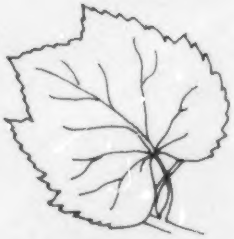

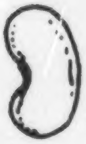

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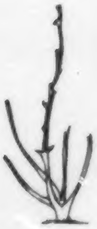

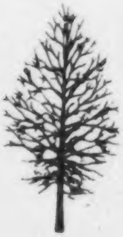

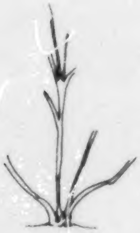

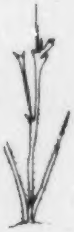

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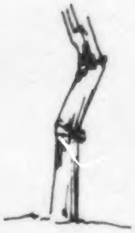
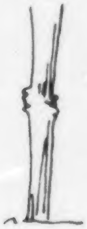
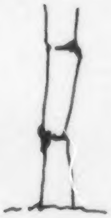
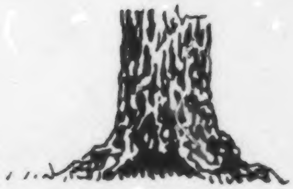
5

5. Below are four things. Put an X on the one that is different from the other three.





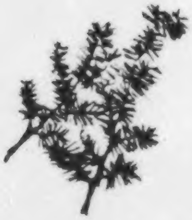


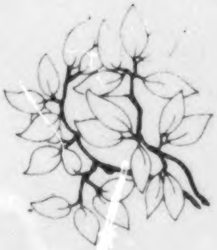


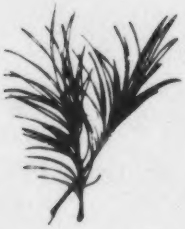
Stop

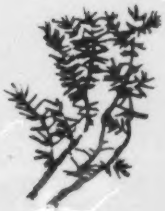
6

6. Below are four things. Put an X on the one that is different from the other three.





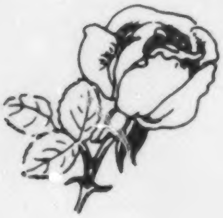
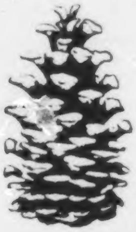
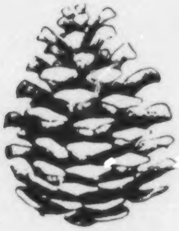
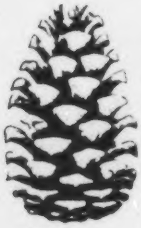




Stop

7

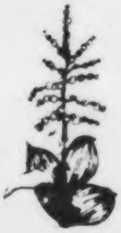
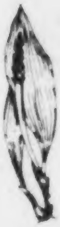
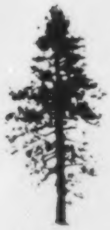
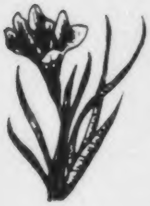
7. Below are four things. Put an X on the one that is different from the other three.

Stop

8

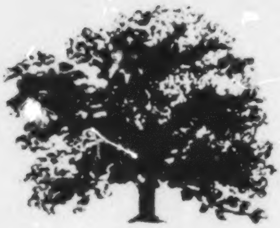
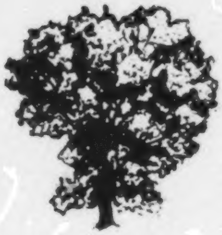
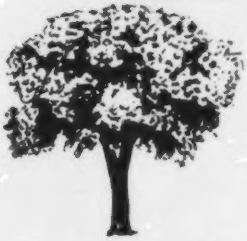
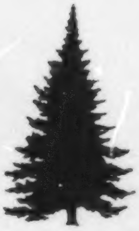
8. Below are four things. Put an X on the one that can live for many years.

Stop

9

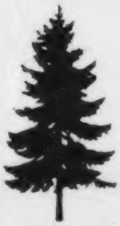
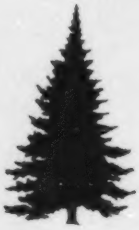
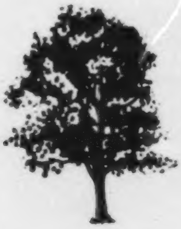
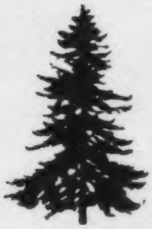
9. Below are four things. Put an X on the one whose branches extend in a whorled pattern.

Stop

10

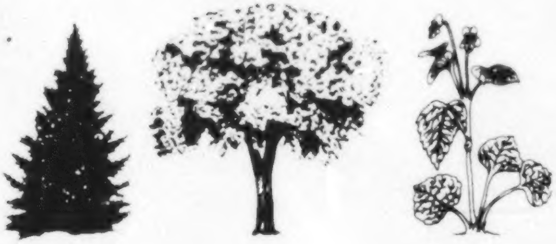
10. Below are four things. Put an X on the one whose leaves fall at the end of the growing season.

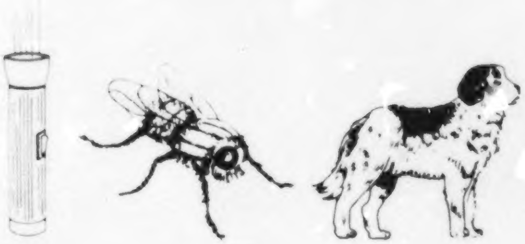
Stop

11

11.



Group 1



Group 2

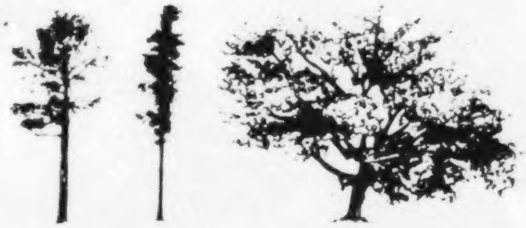
What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

a. flowers
b. trees
c. green plants
d. herbs
e. I don't know

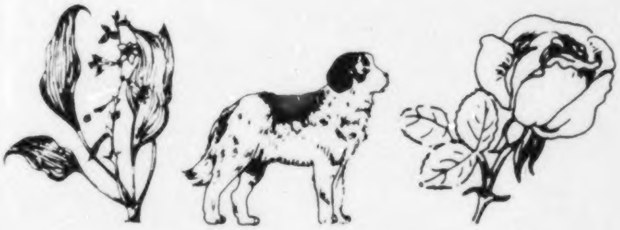
Stop

12

12.



Group 1



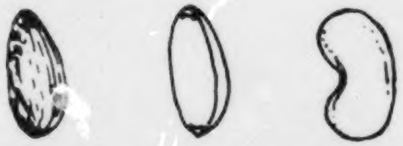
Group 2

What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

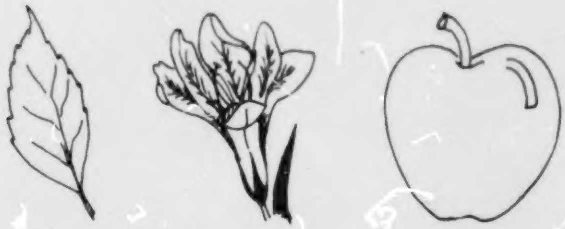
a. evergreens
b. needles
c. trees
d. shrubs
e. I don't know

Stop

13.



Group 1



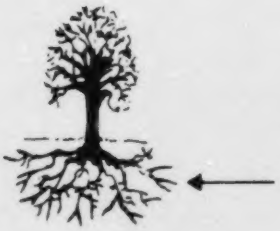
Group 2

What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

a. seeds
b. roots
c. branches
d. stems
e. I don't know

Stop

14.

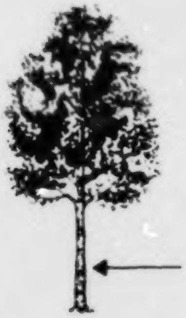


What one word best indicates what the arrow is pointing at?

a. flowers
b. leaves
c. barks
d. roots
e. I don't know

Stop

15.



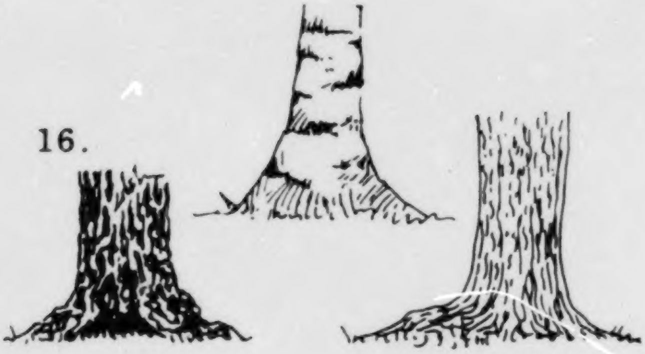
What one word best indicates what the arrow is pointing at?

a. rod
b. stick
c. stem
d. pole
e. I don't know

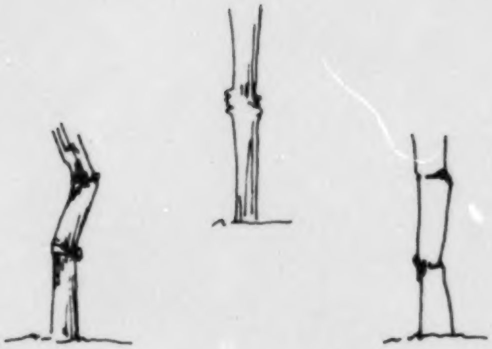
Stop

16

16.



Group 1



Group 2

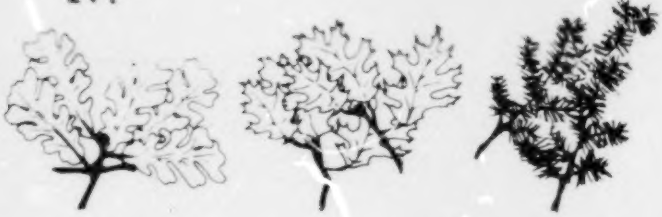
Above are two groups of stems. What one name best fits all of the stems in Group 1 but does not fit all the stems in Group 2?

a. hollow stems
b. woody stems
c. flat stems
d. flowering stems
e. I don't know

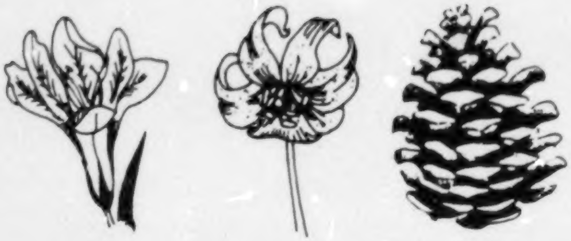
Stop

17

17.



Group 1



Group 2

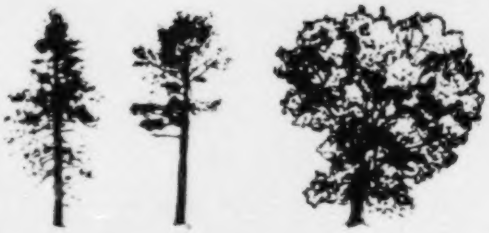
What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

a. leaves
b. stems
c. roots
d. bark
e. I don't know

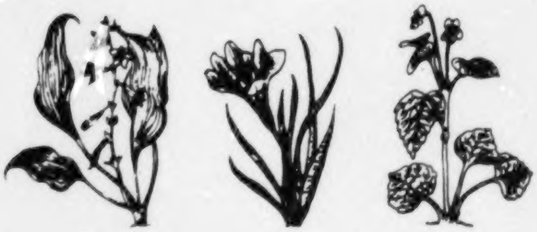
Stop

18

18.



Group 1



Group 2

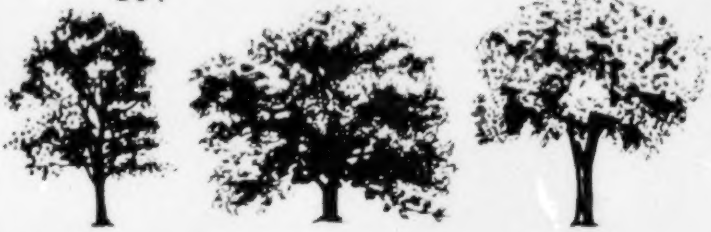
The plants in Group 1 live for many years. The plants in Group 2 die at the end of the growing season. What one name best fits all of the plants in Group 1 but does not fit all of the plants in Group 2?

a. centennials
b. perennials
c. diurnals
d. perpetuals
e. I don't know

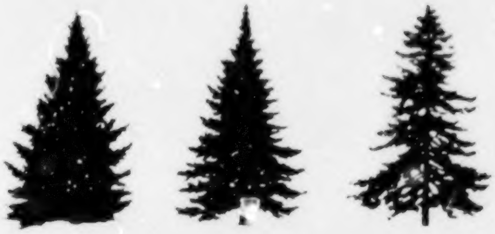
Stop

19

19.



Group 1



Group 2

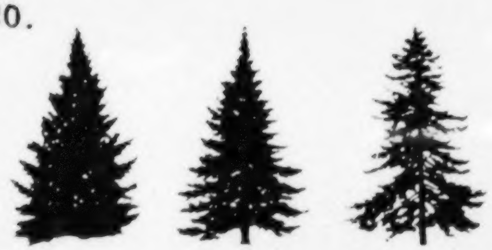
What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

a. vascular trees
b. cellulose trees
c. herbaceous trees
d. deciduous trees
e. I don't know

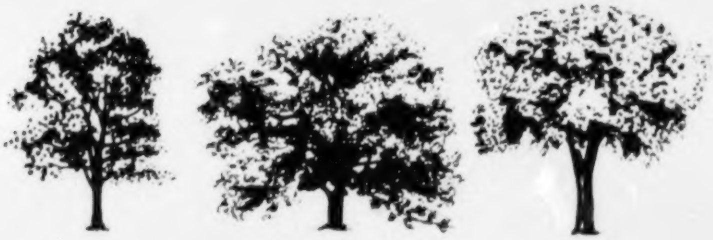
Stop

20

20.



Group 1



Group 2

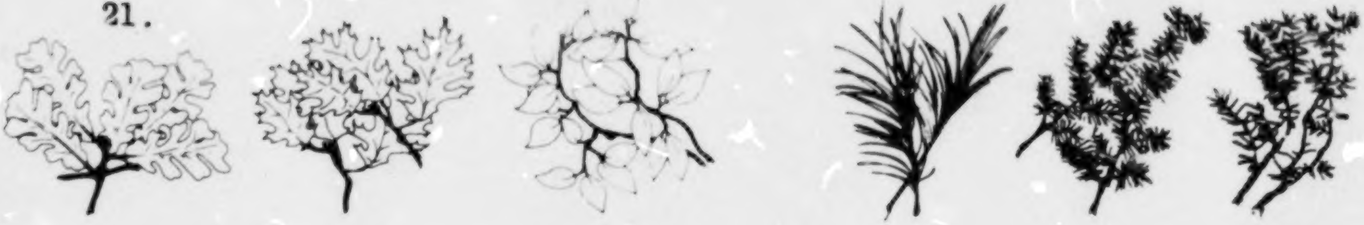
What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

a. geotropic alpine trees
b. photosynthetic trees
c. coniferous evergreen trees
d. annual trees
e. I don't know

Stop

21

21.



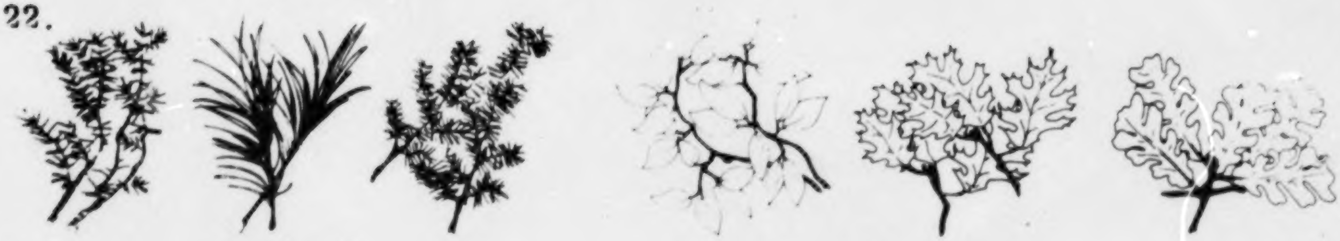
What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

a. ripe leaves
b. mineral leaves
c. broad leaves
d. curled leaves
e. I don't know

Stop

22

22.

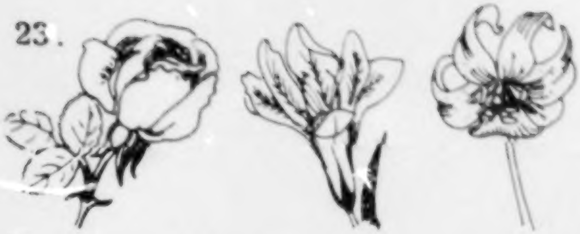


What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

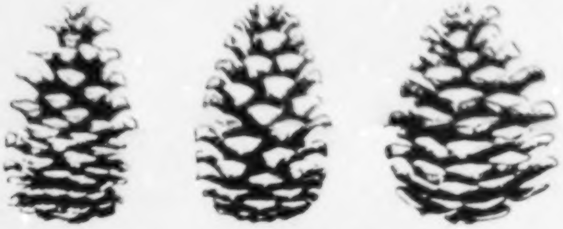
a. spring leaves
b. needles
c. blossom leaves
d. points
e. I don't know

Stop

23.



Group 1



Group 2

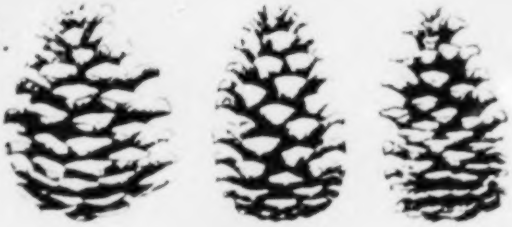
What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

a. sprouts
b. fruit
c. ornaments
d. flowers
e. I don't know

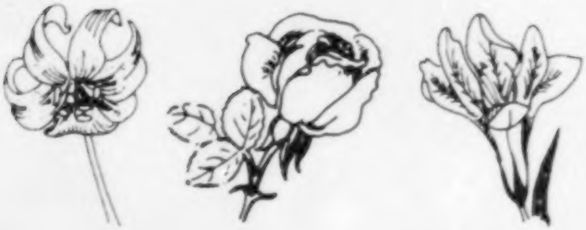
Stop

24

24.



Group 1



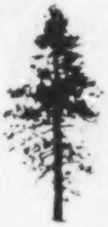
Group 2

What one name best fits all of the things in Group 1 but does not fit all of the things in Group 2?

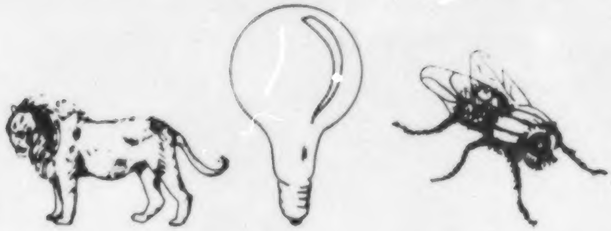
a. acorns
b. cones
c. nuts
d. fruit
e. I don't know

Stop

25.



Thing X

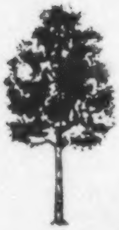


Thing X is different from all of the other things in some way. How is it different?

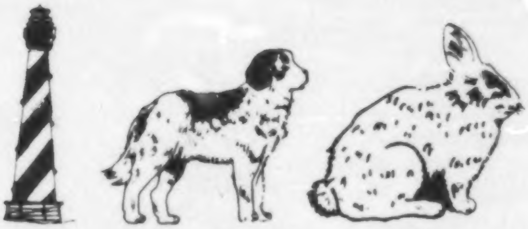
a. Only Thing X is alive.
b. Only Thing X needs food to live.
c. Only Thing X has roots.
d. Only Thing X can make light.
e. I don't know

Stop

26.



Thing X



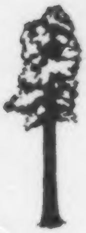
Thing X is different from all of the other things in some way. How is it different?

a. Only Thing X can be used for food.
b. Only Thing X uses light.
c. Only Thing X has legs.
d. Only Thing X has leaves.
e. I don't know

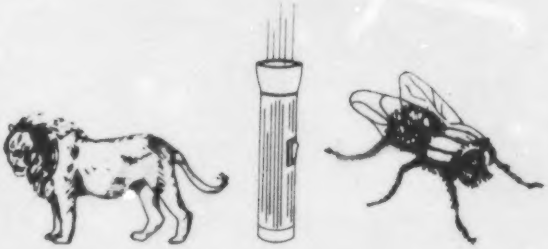
Stop

27

27.



Thing X



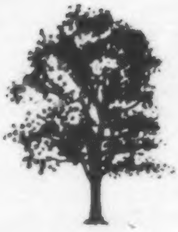
Thing X is different from all of the other things in some way. How is it different?

a. Only Thing X has seeds.
b. Only Thing X has skin.
c. Only Thing X needs air.
d. Only Thing X needs water.
e. I don't know.

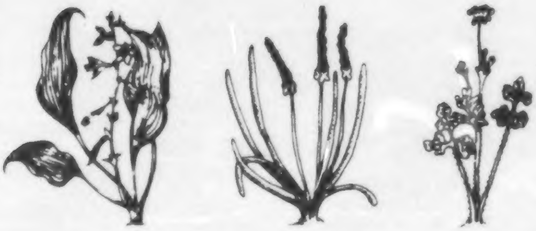
Stop

28

28.



Plant X

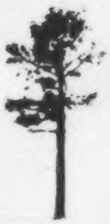


Plant X is different from all of the other plants in some way. How is it different?

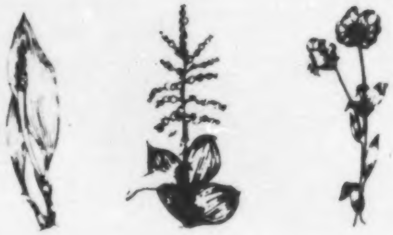
a. Only Plant X has a stem.
b. Only Plant X has roots.
c. Only Plant X has many main stems.
d. Only Plant X has a single main stem.
e. I don't know

Stop

29.



Plant X



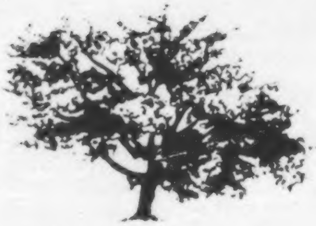
Plant X is different from all of the other plants in some way. How is it different?

a. Only Plant X has a smooth stem.
b. Only Plant X has a woody stem.
c. Only Plant X has a living stem.
d. Only Plant X has a stem that transports water.
e. I don't know

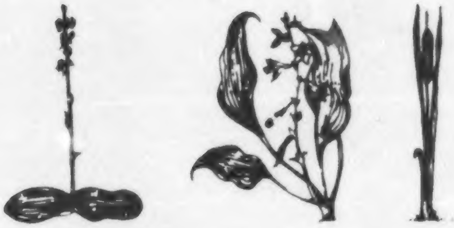
Stop

30

30.



Plant X

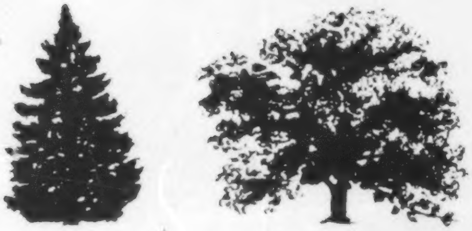


Plant X is different from all of the other plants in some way. How is it different?

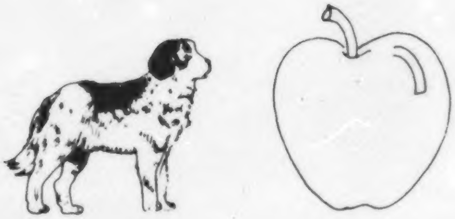
a. Only Plant X can live through a hot summer.
b. Only Plant X stops growing after one year.
c. Only Plant X can live for many years.
d. Only Plant X can live through a wet spring.
e. I don't know

Stop

31.



Group X

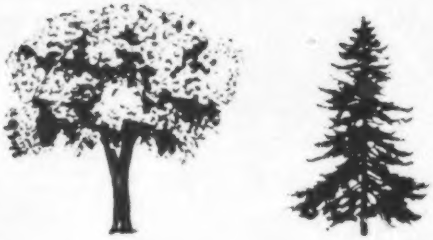


Group Y

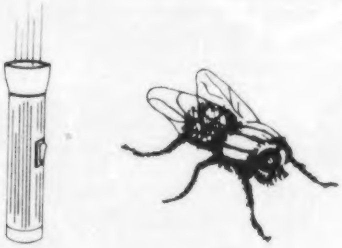
The things in Group X are different from the things in Group Y in a certain way. How are they different?

a. The things in Group X need either air or light.
b. The things in Group X need either food or water.
c. The things in Group X have either broad leaves or needles.
d. The things in Group X have either teeth or legs.
e. I don't know

Stop



Group X



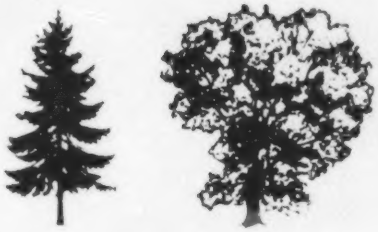
Group Y

The things in Group X are different from the things in Group Y in a certain way. How are they different?

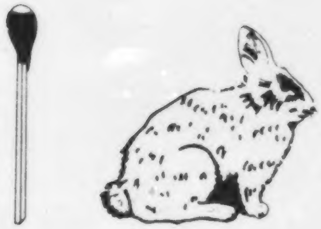
a. The things in Group X have either cones or flowers.
b. The things in Group X are either tall or short.
c. The things in Group X are either metal or stone.
d. The things in Group X have either mass or energy.
e. I don't know

Stop

33

33. 

Group X



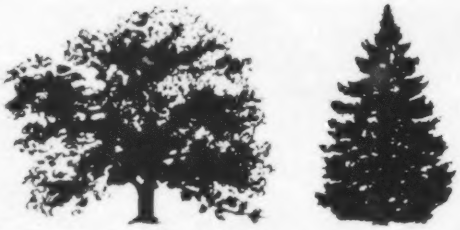
Group Y

The things in Group X are different from the things in Group Y in a certain way. How are they different?

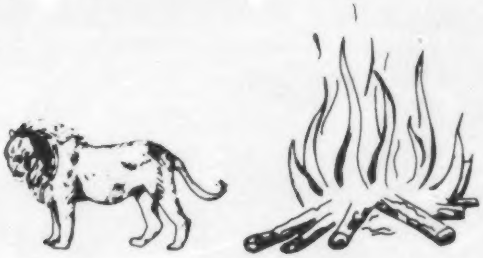
a. The things in Group X are fast, slow, or do not move at all.
b. The things in Group X are found in water, in valleys, or on mountains.
c. The things in Group X have leaves that become flowers, seeds, or fruit.
d. The things in Group X have branches that extend in an alternate, an opposite, or a whorled pattern.
e. I don't know

Stop

34

34. 

Group X



Group Y

The things in Group X are different from the things in Group Y in a certain way. How are they different?

a. The things in Group X either need or produce light.
b. The things in Group X have leaves that either fall at the end of the growing season or may fall at any time throughout the season.
c. The things in Group X have flowers that blossom in either spring or summer.
d. The things in Group X have either wood or energy.
e. I don't know

Stop

35.

Which of the following is the definition of tree?

a. any living thing with leaves
b. a plant that lives for many years and has a single main stem that is woody
c. a plant that lives one year and has a single main stem that is nonwoody
d. any plant that grows well in a forest
e. I don't know

Stop

REFERENCES

Atkinson, R. C., & Shiffrin, R. M. Human memory: A proposed system and its control processes. In K. W. Spence & J. T. Spence (Eds.), The psychology of learning and motivation. New York: Academic Press, 1968, 2, 89-195.

Ausubel, D. P. The psychology of meaningful verbal learning. New York: Grune & Stratton, 1963.

Bruner, J. S. The course of cognitive growth. American Psychologist, 1964, 19, 1-15.

Bruner, J. S., Goodnow, J. J., & Austin, G. A. A study of thinking. New York: Wiley, 1956.

Carroll, J. B. Words, meanings, and concepts. Harvard Educational Review, 1964, 34, 178-202.

Deese, J. Meaning and change of meaning. American Psychologist, 1967, 22, 641-651.

Flavell, J. H. Concept development. In P. H. Mussen (Ed.), Carmichael's manual of child psychology. New York: Wiley, 1970, 1, 983-1059.

Fredrick, W. C., & Klausmeier, H. J. Instructions and labels in a concept attainment task. Psychological Reports, 1968, 23, 1339-1342.

Gagné, R. M. The conditions of learning (2nd ed.). New York: Holt, Rinehart, Winston, 1970.

Ghatala, E. S. Attention and discrimination as operations in concept learning. Mimeographed paper from the Wisconsin Research and Development Center for Cognitive Learning, The University of Wisconsin, 1972.

Guilford, J. P. The nature of human intelligence. New York: McGraw-Hill, 1967.

Kalish, P. W. Concept attainment as a function of monetary incentives, competition, and instructions. Technical Report from the Wisconsin Research and Development Center for Cognitive Learning, The University of Wisconsin, No. 8, 1966.

Klausmeier, H. J. Cognitive operations in concept learning. *Educational Psychologist*, November 1971.

Klausmeier, H. J., Davis, J. K., Ramsay, J. G., Fredrick, W. C., & Davies, M. H. Concept learning and problem solving: A bibliography, 1950-1964. *Technical Report from the Wisconsin Research and Development Center for Cognitive Learning, The University of Wisconsin*, No. 1, 1965.

Klausmeier, H. J., Ghatala, E. S., & Frayer, D. A. Levels of concept attainment and the related cognitive operations. *Theoretical Paper from the Wisconsin Research and Development Center for Cognitive Learning, The University of Wisconsin*, 1972.

Klausmeier, H. J., & Meinke, D. L. Concept attainment as a function of instructions concerning the stimulus material, a strategy, and a principle for securing information. *Journal of Educational Psychology*, 1968, *59*, 215-222.

Levine, M. Mediating processes in humans at the outset of discrimination learning. *Psychological Review*, 1963, *70*, 254-276.

Levine, M. The none-to-all theorem of human discrimination learning. *Journal of Experimental Psychology*, 1967, *73*, 568-573.

Lynch, D. O. Concept identification as a function of instructions, labels, sequence, concept type, and test item type. *Technical Report from the Wisconsin Research and Development Center for Cognitive Learning, The University of Wisconsin*, No. 6, 1966.

Markle, S. M., & Tiemann, P. W. *Really understanding concepts: Or in frumious pursuit of the jabberwock*. Champaign, Ill.: Stipes, 1969.

Tagatz, G. E. Effects of strategy, sex, and age of conceptual behavior on elementary school children. *Journal of Educational Psychology*, 1967, *58*, 103-109.

Tennyson, R. D., & Boutwell, R. C. A quality control design and evaluation model for hierarchical sequencing of programmed instruction. National Society for Programmed Instruction Journal, 1971, 10, 5-10.

Williams, G. F. A model of memory in concept learning. Cognitive Psychology, 1971, 2, 158-184.

Woodruff, A. D. Basic concepts of teaching. Concise edition. San Francisco: Chandler Publishing, 1961.

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